LNG journal
The World's Leading LNG publication

40 pages essential LNG news!

March 2021

In this issue:

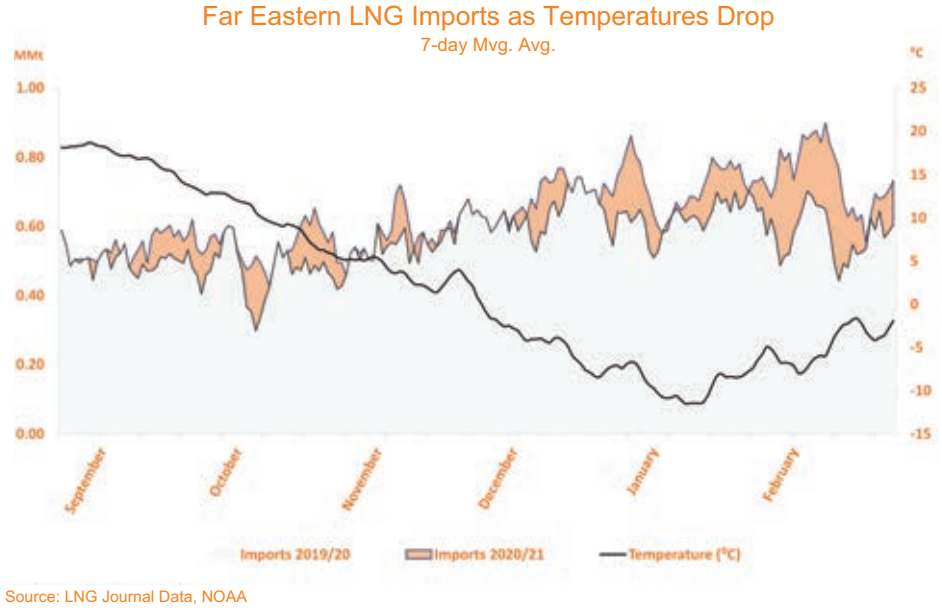
Rush to supply Far East relies on European gas storage

A steep drop in temperatures alongside supply constraints in the Pacific led to European gas storage capacity effectively balancing the global gas market, our Markets Editor Alexander Wilk reports.

European withdrawals from gas storage were instrumental in cushioning an LNG supply crunch in the Far East this winter. Whereas Europe experienced a relatively mild winter for most of the time in December and January, temperatures in Asia plunged considerably. Lacking sufficient strategic gas storage capacity, Asia's big LNG importers soaked up additional cargo volumes whilst congestion at the Panama Canal contributed to constrained shipping capacity. This led to a price spike in the Pacific region, which allowed former importers such Thailand to launch their first re-export and seemingly enticed Shell in bringing its Prelude FLNG barge back into the market. With Russian pipeline gas exports to Europe also down, European utilities were forced to draw on considerable storage capacity to make up the difference. Without this backstop, the LNG supply crunch may well have been more severe and not limited to Asia.

Far Eastern LNG imports increased significantly over December and January, our data shows, adding almost six million tonnes to total LNG volumes imported compared to the same period in 2019. This increase in demand was primarily due to very cold weather in Northeast Asia. Regional temperatures dropped below -14ºC in December, with the 7-day moving average encroaching -12ºC in early January. The wider Beijing area in China suffered its lowest temperatures since 1966. LNG imports in December 2020 and January 2021 amounted to 44.75mmt compared to 38.77mmt in December 2019 and January 2020.

This change in year-on-year LNG demand was primarily driven by China and Japan, where offtakes increased by 3.57mmt and 2.46mmt, respectively, over the most recent period compared to its equivalent last year.



Source: LNG Journal Data, NOAA

In contrast, LNG imports elsewhere declined. European LNG imports in particular showed a drastic decrease, according to our data. Overall, European LNG imports fell by 7.44mmt during the most recent period of December and January whilst concurrent Far Eastern imports increased by 5.99mmt net. As the new year progressed, the shift of LNG from Europe became even more pronounced, with the year-on-year change in European LNG imports between 1st December and 23rd February a decrease of 9.37mmt compared to an increase of 9.15mmt in the Far East, according to our data. Northern European terminals, which enjoy the most advanced interconnectivity, reduced offtakes the most, whilst Southern European terminals – led by Spain and Italy – were unable to reduce imports to the same degree.

Imports decreased globally

Moreover, LNG imports decreased globally by 0.68mmt month-on-month in January. Whilst they remained seasonally low in the Middle East, India cut offtakes by 0.29mmt. The country has traditionally been among the more price-sensitive LNG buyers in the Pacific Basin. Argentina was also absent from the market following a prolonged service suspension at its remaining LNG import terminal at Escobar. It was only in late January that a court allowed the resumption of service at the terminal, although to date this still has not resulted in an Argentine LNG import. LNG imports in Brazil have also decreased as the country came out of its dry season (considerable power capacity in the country is hydropower).

Constrained exports

The decline in global imports by 1.34mmt from 32.98mmt in January 2020 to 31.64mmt in January 2021 arrived alongside a roster of production outages and constraints at liquefaction plants the world over, including the fire-related shutdown of Equinor's Snøhvit LNG in Norway, slower maintenance-induced output from Gorgon and Wheatstone LNG and the protracted outage of Shell's Prelude FLNG barge in Australia. Global exports could have been at least four percent higher than it was in January 2021, but the aforementioned production

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constraints put the brakes on LNG production whilst demand in Asia continued to rise.

Destination switch

When examining the volume divergence of European and Far Eastern LNG deliveries, the other side of the coin was presented by the closely correlated destination switch in favour of the Far East. This was led by LNG volumes shipped from the United States and Qatar. Apart from these two LNG supply centres, Nigeria and Angola were leading a similar general destination switch of West African LNG volumes.

This supply behaviour reached its peak in January this year when the United States cut exports to Europe by 1.41mmt compared to January 2020. At the same time, our data show, US LNG exports to the Far East grew by 0.55mmt. Qatar's case is even more clear-cut, with 1.03mmt being switched away from Europe and 0.96mmt more directed to the Far East.

LNG exports changed in similar fashion in West Africa, with the region comprising Nigeria, Angola, Equatorial Guinea and Cameroon cutting exports to Europe by 0.23mmt whilst increasing shipments to the Far East by 0.88mmt. Angola even eliminated shipments to Europe altogether in January.

Reduced free shipping capacity

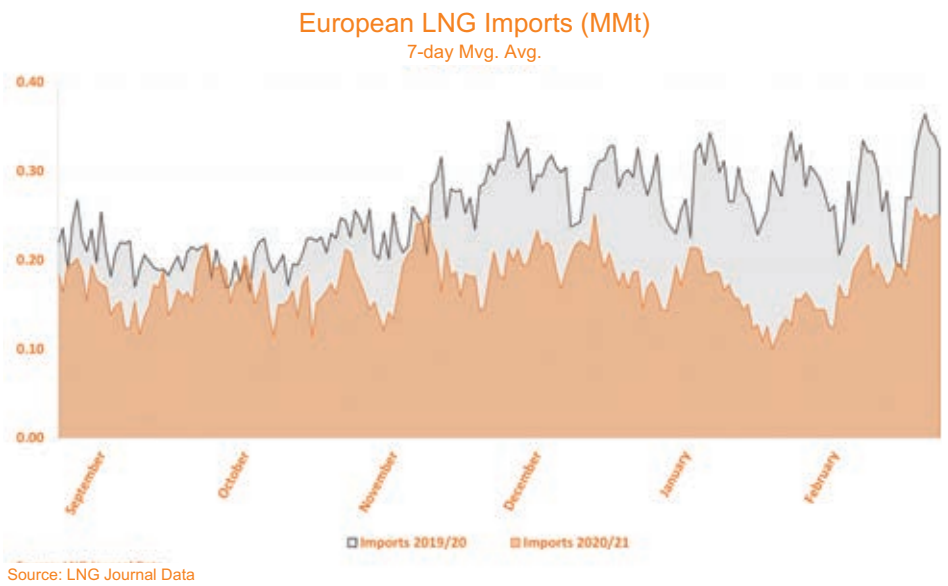
Notably, US LNG exporters increasingly opted to ship their cargoes to the Pacific via longer routes through the Suez Canal, South Africa's Cape of Good Hope and Chile's Cape Horn. Although the Panama Canal route remained the most popular option for US LNG to reach the Far East in particular, we noticed a distinct rise in popularity of the route around the Cape of Good Hope and via Suez among US LNG exporters. Transit costs via Suez tend to be lower than their Panama equivalent whilst the route around South Africa does not carry extra transit fees. Whilst there remained a time penalty of roughly a week for avoiding Panama – a significant difference given the recent steep rise in charter rates – many of the vessels are owned or controlled by the portfolio players themselves and the savings in transit fees will have helped to offset several days' worth of charter rates in some cases. Moreover, a significant tonnage build-up off both the east and west coasts of Panama aided by a surge in container demand prior to Christmas is likely to have also worked to make the route less attractive. According to our voyage data based on originally scheduled arrivals, some LNG shippers had to contend with delays of several days.

This complicated matters for already tight supply conditions in the Far East based on available production capacity. The added journey times resulting from switching destinations in one basin to another led to an inevitable curtailment of free shipping capacity. According to the LNG Journal's voyage data, US LNG exporters directing gas to major European destinations such as the United Kingdom, France and Turkey can expect roundtrips lasting roughly 25-30 days. US LNG heading to the northern part of the Far East – i.e. Japan, South Korea or Northern China – takes around 45 days via the Panama Canal, provided there are no congestion delays. Longer journey times result in effective shipping capacity reductions as longer roundtrips also mean longer ballast journeys.

The resulting shipping capacity shortfall had knock-on effects on re-exports. Whereas European importers have often been quick to seize arbitrage opportunities in Asia, we did not observe re-exports from Europe to the Far East. Overall, there were only two European re-exports in January, which were sent to Dabhol in India and the 'Excellence' FSRU offshore Bangladesh. However, we also recorded two re-exports from rather unusual sources: Indonesia's Arun terminal and Thailand's Map Ta Phut LNG.

Thai state-owned energy conglomerate PTT delivered its first LNG cargo to Japan's Higashi-Ogishima terminal. The cargo was a re-export from PTT's Map Ta Phut terminal south of Rayong via the LNGC Symphonic Breeze. The Higashi-Ogishima LNG terminal is operated by Japanese utility Tokyo Electric Power (TEPCO). The Symphonic Breeze's cargo should suffice to supply much of greater Tokyo with electricity for several days if the entire cargo is used for thermal power generation. TEPCO operates a 3.4 GW thermal power station at Ogishima but the LNG terminal is also adjacent to a major steel production site.

According to our data and calculations, the LNGC Symphonic Breeze shipped c. 0.06mmt from Thailand to Japan, which put the former on the map as the world's latest LNG re-exporter. The cargo re-export departed Map Ta Phut late January and arrived in Japan early



Source: LNG Journal Data

Source: LNG Journal Data

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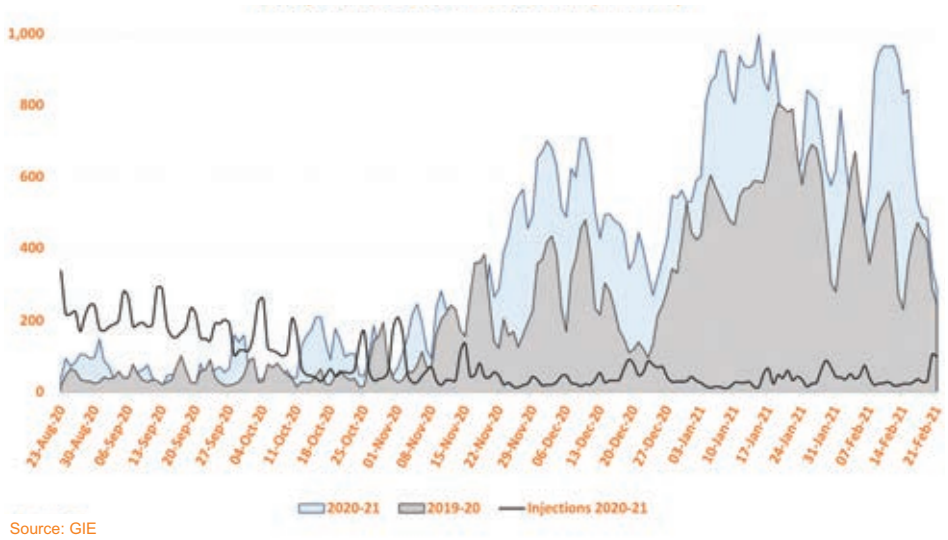
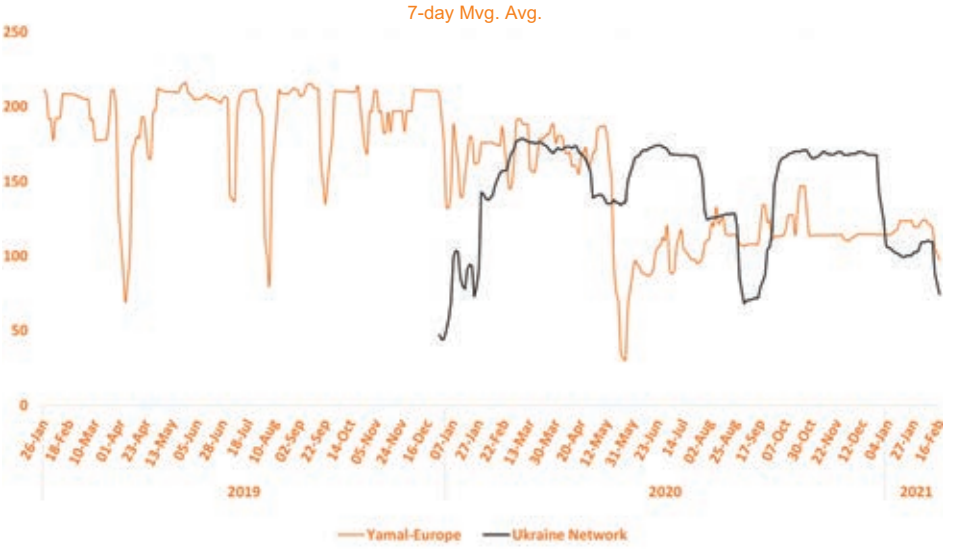
European Gas Stock Withdrawals (Mln. m³)



Source: GIE

Russian Gas Pipeline Exports to European Union (Mln. m³)

7-day Mvg. Avg.



Source: ENTSOG, Ukraine TSO

February. To date, such transactions have mainly been carried out by European terminals in Spain, France, the Netherlands and Belgium.

Result: Exploding prices

This resulted in a price rally in Asia, with the JKM index rising above US$10/mmBtu in December to US$20/mmBtu in early January and to a record high of US$32/mmBtu in mid-January, according to Platts.

Incidentally, the price rises seemingly enticed Shell to reinstate its Prelude FLNG barge in late January. We highlighted in early January that the floating plant received a cooldown cargo via the Shell-controlled LNGC Methane Heather Sally in November, which suggested to us renewed LNG shipments were planned for January 2021. Prelude shipped 0.11mmt via two cargoes aboard the Symphonic Breeze and Oceanic Breeze to Japan that month. This gives credence to our previous assumption that the facility's past suspension, which was first put in place due to technical issues, was prolonged by lower prices.

Europe relies on gas storage

As discussed above, LNG imports were slashed by 7.44mmt during the most recent period of December and January. Whilst it may be tempting to conclude that a lack of European consumption was to blame – after all most of the continent remains in lockdown to prevent the spread of coronavirus – industrial output in the Eurozone had grown by 2.3 and 2.6 percent in December and January, respectively, according to Eurostat. However, a relatively warm European winter undoubtedly helped in keeping gas consumption for heating in check.

Nevertheless, as LNG supply to Europe suffered, there was a sharp increase in storage withdrawals in contrast to the previous year. The equivalent extra of roughly 16.11mmt in LNG was withdrawn from storage in the period of November 2020 to January 2021 compared to the same in the previous year.

Russian pipeline gas down

Although throughput via the Nordstream pipeline connecting Germany with Russian gas fields via the Baltic Sea remained broadly steady year-on-year (down only marginally by 0.05 percent), reported pipeline data indicate the Yamal-Europe pipeline running through Poland has seen curtailed throughput for the period between mid-November and mid-February compared to the previous year and the one before that. Moreover, Russian EU deliveries via Ukraine also nosedived alongside a drop in Gazprom's booked annual capacity for 2021, which the company chose not to replenish with short-term capacity in January, data by Ukraine's gas transmission system operator show.

Concluding thoughts

Effectively, then, European gas storage was instrumental in preventing a worse supply crunch in the Far East.

Lower Russian pipeline gas supplies this winter support that case. Notably, the Far Eastern market lacks sizeable gas storage capacity relative to its demand.

Whilst China has some capacity, this is thought to be rather limited with hard figures difficult to come by. Meanwhile, utilities in Japan, Korea and Taiwan heavily rely on their LNG terminals' tanks for storage, which requires an LNG supply chain not unlike the just-in-time (JIT) production model seen in the automotive industry. Incidentally, the JIT concept is a Japanese innovation. All three are island/peninsula nations, meaning pipeline connectivity is very difficult to establish due to the immense water depths of the Pacific and geopolitical constraints. Moreover, space on land comes at a premium, which, alongside mostly unfavourable terrain, resulted in relatively weak domestic pipeline networks, too. As such, LNG volumes kept 'in storage' is mostly limited to what is actually in the tanks and moreover can only supply endpoints within a relatively small radius. This is in stark contrast to the extensive facilities comprising depleted gas fields or salt caverns as well as ever increasing pipeline interconnectivity in Europe. ■

Texas limits LNG exports during February's cold freeze to avoid grid collapse

The US state of Texas, the country's biggest oil producer and proud of its energy independence, has narrowly avoided a cascade of power failures when a historic winter storm hit the state for 10 days in mid-February. The state energy regulator mandated gas prioritization for power generation and ordered strict limits to LNG exports and flows of pipeline gas to Mexico. Markets Editor Anja Karl investigates.

Texas' power grid operator, the Electric Reliability Council of Texas (ERCOT) in the early morning hours of Feburary 15, 2021, was forced to implement rolling outages to balance the spike in electricity demand with the limited available supply. A total grid collapse loomed large but could be avoided thanks to some surplus gas supply in storage near several peaking power stations. Natural gas fuels more than 40,000 MW of generating capacity in Texas during peak periods, but the cold freeze disrupted production and made pipeline compressors trip.

Upstream gas production was reduced during the freezing cold weather and lower transmission rates through intrastate pipelines meant that power generation had to rely on onsite storages for fuel supply. US gas production fell by 21.0 billion cubic feet per day (Bcf/d), down from 90.7 Bcf/d on February 8 to about 69.7 Bcf/d on February 17, data from IHS Markit shows. A large portion of the decrease in natural gas production was from declines in Texas, which fell over 10 Bcf/d during that period.

Number of LNG shipments nearly halved

Exports of liquefied natural gas from Texas and the southern part of the United States were severely affected by the cold spell, as heightened domestic demand was prioritised and exports were cut back. The volume of LNG exports nearly halved with just 11 cargos exported – three each from Sabine Pass and Cameron, two each from Corpus Christi and Freeport, and one from Cove Point – compared with an average 19 to 20 in the previous weeks.

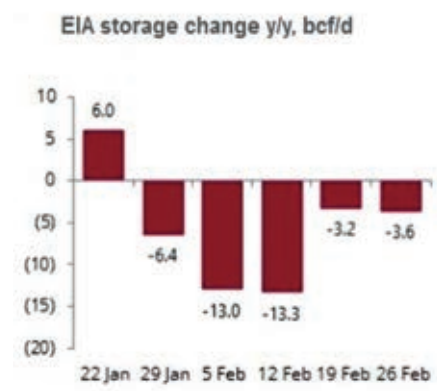
Regulatory restrictions in feedgas supply to Texan liquefaction plants limited exports, and vessels struggled to navigate during the winter storm. According to shipping data, just 40 Bcf of LNG-carrying capacity left the US at the height of the winter storm in the week ending February 17, but exports rebounded to a combined 50 Bcf in the week ending February 24.

"US LNG exports were affected by fog and extreme winter weather conditions that caused suspension of piloting services for several days at Gulf Coast ports that serve LNG export facilities," analysts at the Energy Information Administration (EIA) commented. Deliveries of feedgas to US LNG export facilities averaged 6.2 Bcf/d, or 4.78 Bcf/d lower than the previous week, according to EIA data.

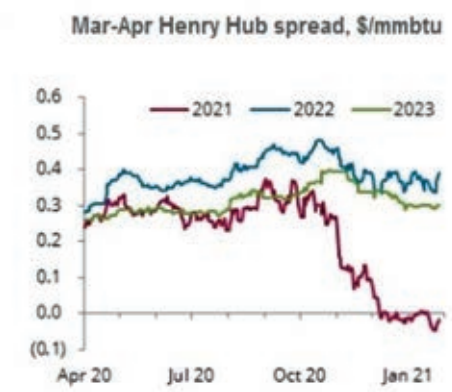
Three cargoes sailed from the Sabine Pass plant in Louisiana and three from Cameron LNG, two each from the Corpus Christi and Freeport facilities in Texas and one shipment left Cove Point in Maryland. The US weather disruptions also pushed down pipeline gas exports to Mexcio by 14.1 percent in the week from the 5.5 Bcf per day average, contributing to power outages in northern Mexico.

The cold freeze across Texas and Louisiana had been propelling up daily deliveries. Latest available flow data from the American Gas Association shows that on February 15, 68.9 billion cubic feet (Bcf) of natural gas flowed to residential and commercial sector, 27.5 Bcf to industrial, 39.7 Bcf to power generation and 9.8 Bcf was exported.

US pipeline gas exports had been substantially reduced, to make more supplies available north of the border, which in turn put millions of households in northern Mexico at risk. Local utilities were starting to ration gas deliveries and reduce the runtime of gas peaking plants, which largely rely on imported gas.



Source: EIA, Energy Aspects



Source: CME, Energy Aspects

Spot prices surged at Waha and Henry hub

The demand spike and simultaneous drop in gas production during the winter storm made prices for natural gas spiral to record heights. The price of natural gas at the Waha Hub, near upstream activities in the Permian Basin, surged to over $206 per million British thermal units (MMBtu) on February 16, the highest reported price at the Waha Hub since at least 1995.

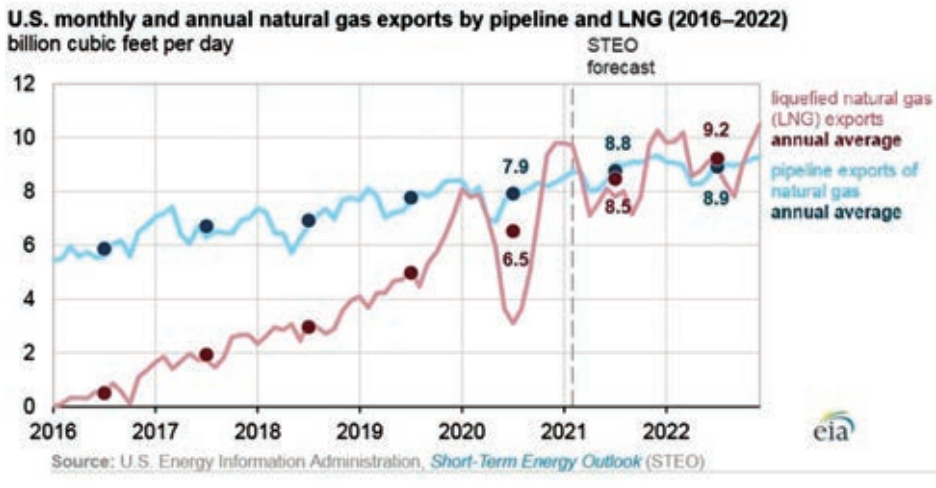
Spot gas prices at the US bellwether Henry Hub increased to $23.61 per MMBtu, the highest inflation-adjusted price since February 2003. In the Midwest, the EIA data showed that Chicago Citygate prices rose to $129.52 per MMBtu, the highest on record going back to 1993.

US Gulf Coast LNG futures prices were largely unaffected and prices for the front-month eased slightly. The March derivative contract for free-on-board (FOB) cargoes fell to $4.673 per MMBtu versus $4.690 per MMBtu a week earlier.

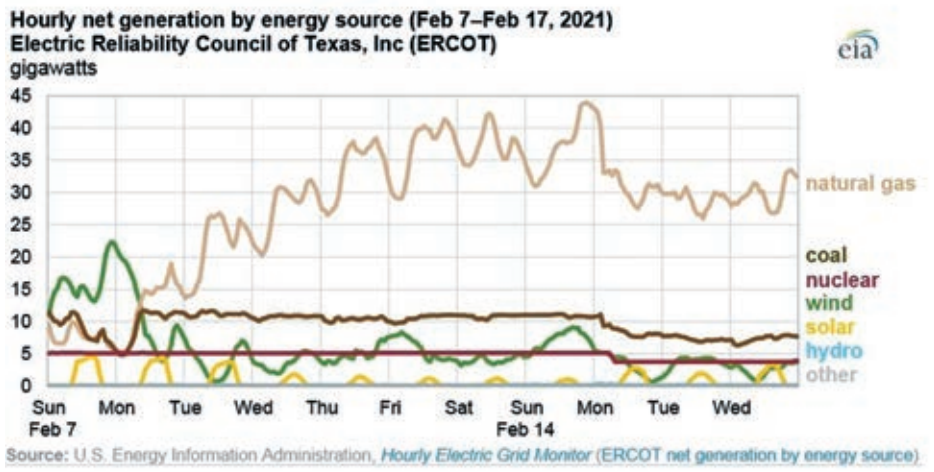
North Sea Brent crude oil prices rose to their highest in 13 months during the week and broke the $65 per barrel level before falling back to $63.50 on Friday, February 19. Analysts noted that oil prices were supported by the weather-related US supply problems with refineries on the US Gulf Coast and oil production curtailments. At current oil price levels, the long-term, crude-linked LNG price was last seen trading around $9.25 per MMBtu.

Sharp fall in gas supply and power output

The sharp fall in upstream gas production in the Permian Basin reduced the regular gas deliveries to Texan power producers, and left many reliant on their onsite fuel storages. Thankfully, several gas peaking power stations had replenished their gas storages prior to the winter which insulated them against supply shortages and allowed them to continue generating peakload power supply.



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO)



Source: U.S. Energy Information Administration, *Hourly Electric Grid Monitor* (ERCOT net generation by energy source)

However, Grid Monitor data showed that the contribution of gas-fired power fell sharply once ERCOT began implementing rotating outages at midnight on February 15. Output from coal-fired plants, a nuclear facility, and wind farms all fell near midnight on February 15 and remained at the lower level – exacerbating the shortage in electricity supply.

As a result, ERCOT had to implement rolling blackouts as the grid operator was unable to fully meet demand. Under emergency conditions, the grid operator initiated load shedding of the available 10,500 MW – just about enough to power two million homes. As of February 18 morning, nearly 40,000 MW of power gen capacity had to remain off the system – at the time supply was limited to 23,500 MW thermal load and 16,500 MW wind and solar energy, according to ERCOT figures.

The Texan governor Greg Abbott called for an urgent review of ERCOT's preparations prior to the latest winter storm, saying the grid operator "has been anything but reliable over the past 48 hours." He also levied part of the blame for outages on private power generators.

Lack of interstate grids exacerbates blackout risk

Texas, home to the US oil and gas industry, has been adamant to refuse the adoption of some federal energy regulation as it has been proud to manage the state's energy needs independently. The grid operator manages the supply and distribution of electric power to 26 million customers in Texas, covering about 75% of the state's territory and 90% of its electric load.

The electric power system in Texas is at a higher risk of blackouts because ERCOT keeps refusing to join interstate electricity grids which would enable power imports at the event of a cold spell or heat wave. This puts the grid at the brink of collapse in the event of a technical failure at a large power station, or in the event of a winter storm or heat wave.

The latest winter storm in February left more than 4 million people without electricity in Texas as the grid operator was not able to cope with the sudden demand spike, while fuel shortages forced some utilities to idle their power stations. A total blackout was narrowly avoided.

ERCOT needs to ration energy supply each summer

Every summer, the Texas grid operator needs to issue power emergency alerts and the system's electric reserve margin of around 8.6% is insufficient to meet strong electric demand growth. Power grid operators typically aim for reserve margins of 10% to 15% and ERCOT itself had set a target of 13.75% and the Federal Energy Regulatory Commission (FERC) has repeatedly voiced concerns about ERCOTs low reserve margin and about gas supply constraint in West Texas.

Part of the reason to the latest near-collapse of the Texas power grid is due to an earlier decision, taken in 1999, to fully deregulate the market and hand the control of the state's electricity supply to private power generators, energy retailers and transmission companies. The top-to-bottom deregulation, signed into law by the former President George W. Bush, reduced wholesale power prices but had fewer safeguards.

Today, Texas is the only US state with a stand-alone electricity grid without interconnections to other market zones. This lack of interconnection capacity means that Texas is at greater risk of blackouts, given that almost no electricity can be imported from other regions in the event of a sudden spike in demand.

Critics want FERC to have more of a say in Texas

ERCOT is also not under any federal oversight and is largely responsible to manage its own sources of energy supply, transmission as well as power generation capacity.

Cheap natural gas, abundant in Texas, powers much of the state's installed generating capacity but the rise of intermittent wind power in-feed means that the supply is much less stable, and balancing the grid becomes much more of a challenge. Cost-conscious utilities, however, avoid investing in extra backup capacity which makes the overall system prone at to failure.

It remains to be seen if any lessons will be learned from the latest near-collapse of electricity supply in Texas. Though the US Federal Energy Regulatory Commission (FERC) has no jurisdiction over ERCOT's electricity business to date, it does in some instances have a say over the transportation and storage of natural gas in the state which gives it some authority to ensure reliability of energy supply, which it may now use to a greater extent in the future. ■

US LNG exports forecast to exceed pipeline gas exports in 2022

Exports of liquefied natural gas from the US will exceed gas exports by pipeline in the first and fourth quarter of 2021, as well as in 2022 on an annual basis. Monthly US LNG exports reached a record of 9.4 Bcf/d in November and of 9.8 Bcf/d in December 2020 and January 2021, according to shipping data, and are forecast to average 9.7 Bcf/d in February.

Following the winter demand spike, US LNG exports will decline to seasonal lows in the shoulder months of the spring and fall seasons, government analysts noted.

In November through January, LNG prices rallies - particularly in Asia - where a period of cold winter weather caused fuel shortages and prompted the diversion of several cargoes from the Atlantic to the Pacific basis. The tight market situation was exacerbated by unplanned outages at several LNG export facilities, e.g. in Australia.

Corpus Christi Train 3 adds to LNG export capacity

Eager to cash in on the high spot LNG prices in Asia, all six US liquefaction and export facilities have been operating near full design capacity since November. And in December, the Corpus Christi LNG facility in Texas commissioned its third and final LNG train six months ahead of schedule, bringing the total U.S. liquefaction capacity to 9.5 Bcf/d baseload, or 10.8 Bcf/d peakload.

US pipeline gas exports to Mexico, meanwhile, have risen as well throughout winter 2020/21 but by a far smaller volume than overall LNG exports. Deliveries of pipeline gas from the United States to Mexico increased by 6.4% in the first eleven months of 2020 compared with the same period in 2019 following the completion of a new segment of the Wahalajara pipeline system in June and the Cempoala compressor station in September.

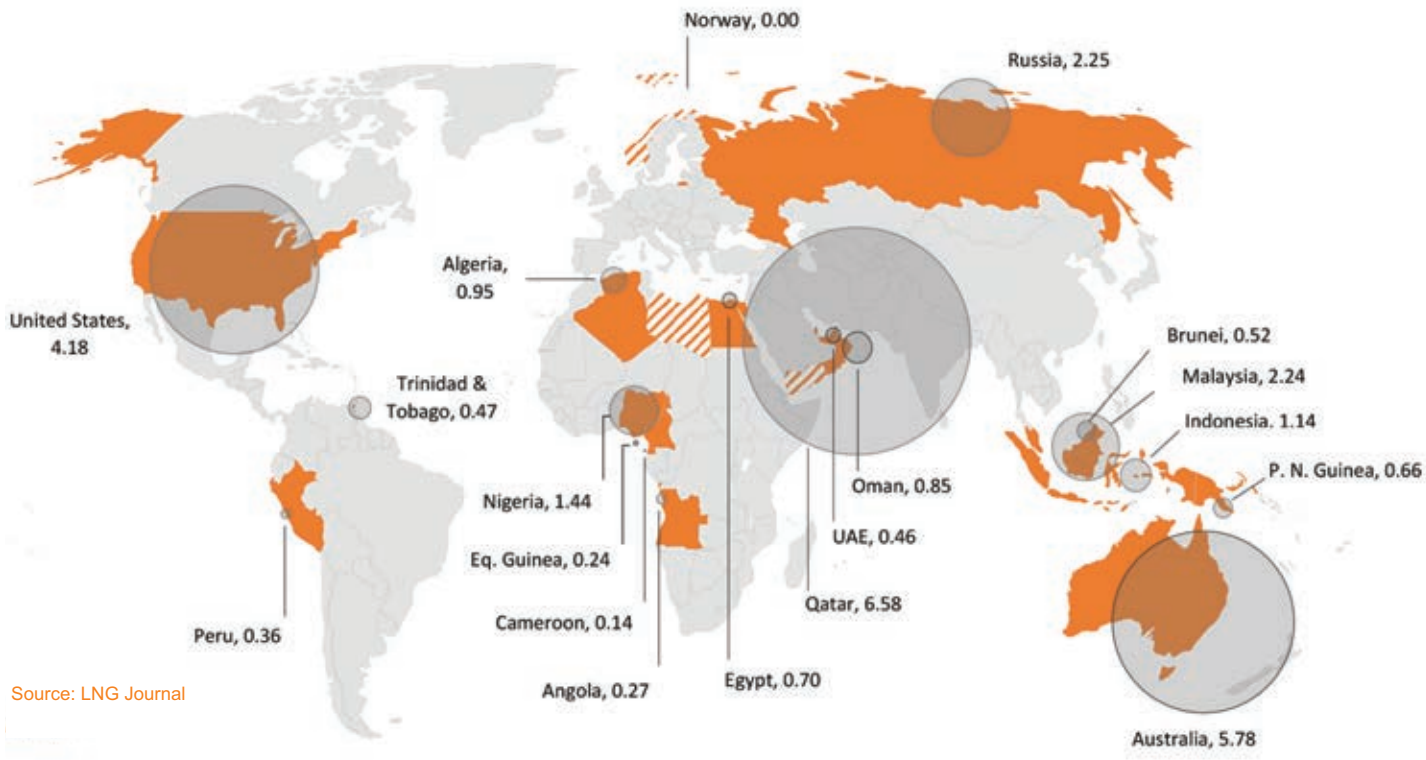
The start-up of Mexico's Samalayuca-Sásabe pipeline with a capacity of 0.47 Bcf/d in January 2021, and the expected completion of Tula-Villa de Reyes pipeline with 0.89 Bcf/d capacity later this year are expected to further increase U.S. pipeline exports to Mexico. ■

February trade down on supply issues and lower Far Eastern demand

February LNG trade slumped as US LNG exports struggled amid lower feedgas supply whilst key Far Eastern importers retreated, our Markets Editor Alexander Wilk reports.

Global LNG trade took a hit in February, decreasing by 4.05mmt (-12 percent) as LNG exports struggled to move past a steep drop in US LNG shipments. Australia and Qatar also cut LNG exports by similar amounts as Far Eastern imports nosedived. Lower Far Eastern demand was led by China, where offtakes were slashed by 3.11mmt in February. Notably, the month marks the occurrence of the Chinese New Year alongside a significant slowdown in monthly industrial output. Taking advantage of available volumes, South Korea as well as a roster of typically price-conscious buyers comprising Bangladesh, Thailand and others boosted offtakes. In Europe, key importers led by the United Kingdom saw robust demand growth although this was tempered by lower demand in Portugal and Spain. In South America, the end of the dry season led to offtakes being cut further. Trade performance saw a significant gap of 1.78mmt (-6 percent) on its year-on-year equivalent in February 2020.

Global LNG Exports (MMt)



Source: LNG Journal

Exports

Our data for February indicate month-on-month export performance came in significantly below that of January, with shipments decreasing by 4.21mmt (-13 percent) in February compared to the slight increase of 0.66mmt (2 percent) seen the month prior. The drop in exports was led by the Atlantic Basin, where shipments were down by 2.28mmt (-20 percent) over January to reach 9.03mmt. Exports from the Pacific Basin, meanwhile, had decreased by 1.14mmt (-9 percent) month-on-month. Concurrently, the Middle East also saw exports decrease by 0.79mmt (-8 percent) as Qatar cut shipments in February.

The Pacific Basin ended the month of January with 11.45mmt in exports, down by 1.14mmt (-9 percent) compared to the 12.59mmt recorded in January. Consequently, the Basin's capacity utilisation decreased by 9pp to 85 percent.

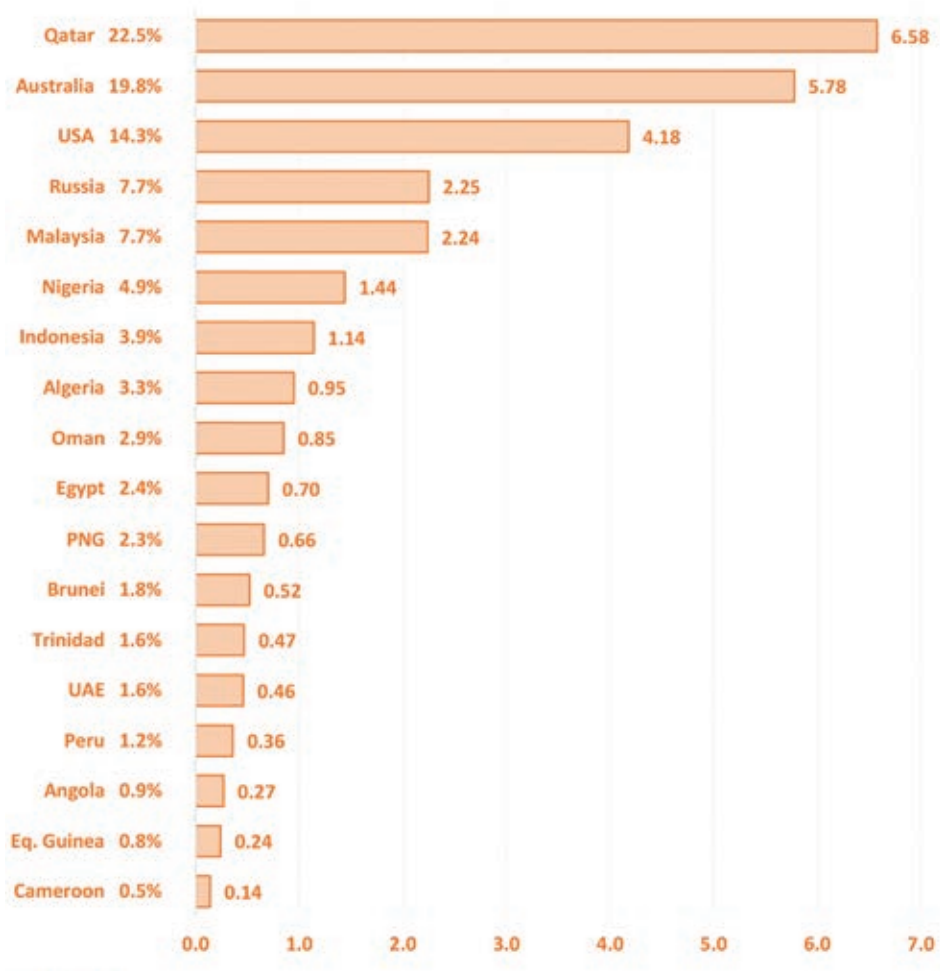
In line with the Pacific's overall performance in February, the Basin's biggest exporter – Australia – at 5.78mmt shipped 0.75mmt (-12 percent) les month-on-month. The country thereby picked up the thread of lower month-on-month exports as was the case in December. In February, exports from NWS LNG in particular decreased by 0.24mmt (-21 percent) from 1.14mmt to 0.90mmt. This was followed by Wheatstone LNG, which saw shipments decrease by 0.15mmt (-19 percent) to 0.65mmt. Ichthys LNG, Pluto LNG, Darwin LNG, Gorgon LNG and APLNG LNG also decreased LNG output by a total of 0.48mmt. These five plants usually benefit from robust monthly demand in China, but where demand was down month-on-month due to national holidays.

Among Australia's onshore plants it was thus only Gladstone LNG that managed to increase exports as QCLNG kept monthly shipments steady at 0.71mmt. The facility shipped 0.08mmt (15 percent) more month-on-month, reaching 0.60mmt in February. Whereas Australia's monthly exports to South Korea increased robustly by 0.62mmt (122 percent) in February, send-outs to Japan were down considerably by 1.10mmt (-39 percent). The country's exports to China were also down by 0.41mmt (-17 percent) whilst shipments to Taiwan retreated by 0.20mmt (-33 percent). As such, even a total of 0.37mmt of Australian LNG shipments yet to confirm their destinations within the Pacific Basin may alter the result for individual destinations but not for Australia as a whole.

As to Australian offshore LNG production, Shell's Prelude FLNG barge continued to ramp up exports in February. Shipments increased from 0.11mmt in January to 0.15mmt in February, up 0.04mmt (36 percent) month-on-month.

North of Australia, Papua New Guinea's PNG LNG saw shipments decrease marginally by 0.01mmt (-1 percent) to 0.66mmt compared to January, our data shows. Notably, the plant continued to produce above nameplate capacity in February. Although

February Market Share & LNG Exports by Country (MMt)



Source: LNG Journal

PNG LNG also continued to see its market share in China decrease by 0.08mmt, it was able to almost compensate with a 0.07mmt export to South Korea as shipments to Japan and Taiwan remained steady.

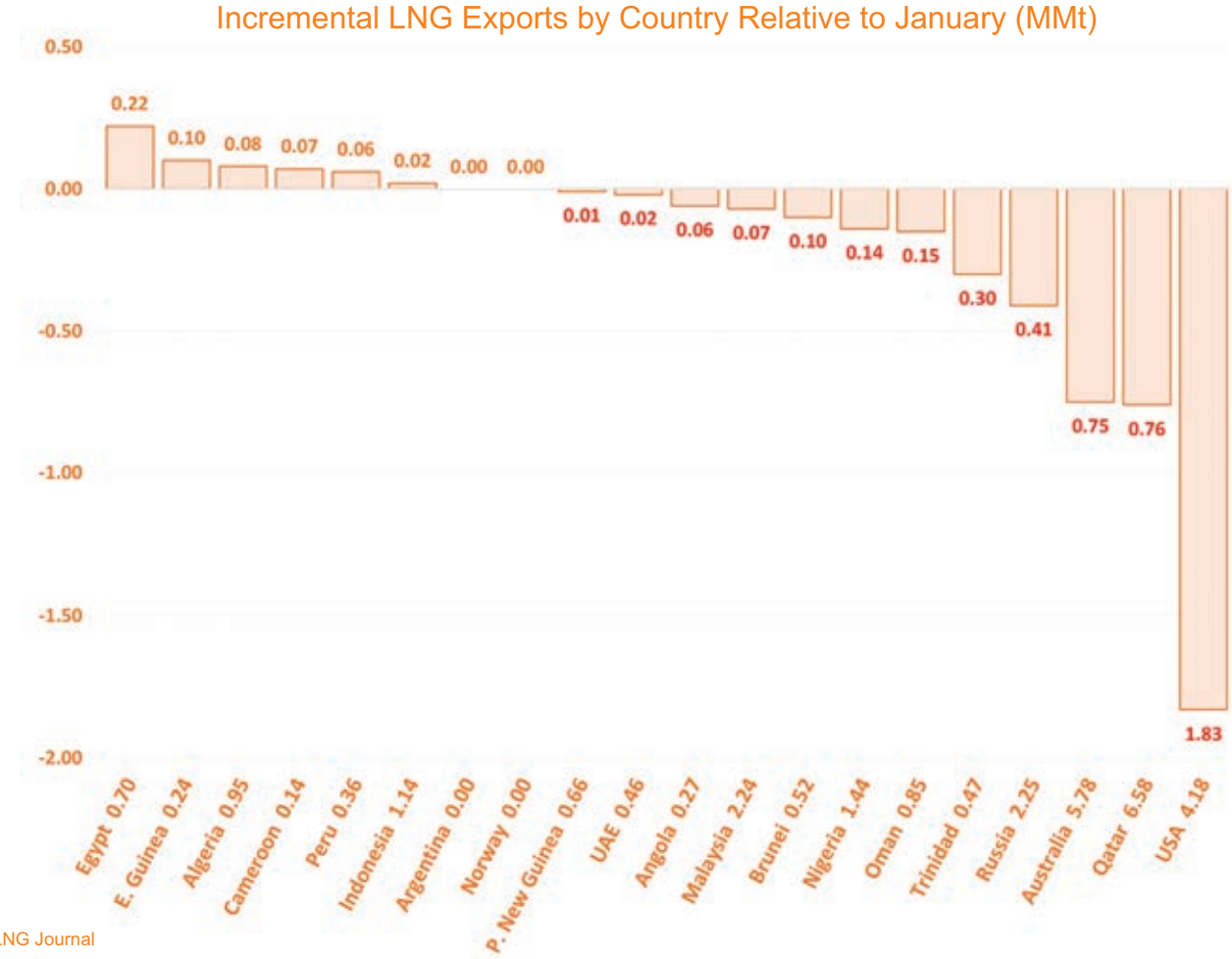
In Indonesia, the amount of LNG shipped increased slightly by 0.02mmt (2 percent) to 1.14mmt. The country thereby returned to month-on-month export growth, helped especially by higher domestic demand of 0.34mmt and increased shipments to other Pacific destinations such as Myanmar, South Korea and Mexico totalling 0.14mmt. However, these increments were almost negated by a significant decrease in shipments to China, Japan, Thailand and Taiwan totalling 0.38mmt.

Neighbouring Malaysia saw monthly exports decrease by 0.07mmt (-3 percent) to 2.24mmt in February. Although the country still had 0.17mmt of shipped LNG without confirmed destinations at the time of writing, demand for its gas is likely down in both China and Japan. Visible exports to South Korea remained broadly steady at 0.37mmt whilst an additional shipment each to Thailand and Myanmar were insufficient to produce month-on-month growth.

Alongside Malaysia's reduction, Brunei LNG decreased February exports by 0.10mmt (-16 percent) to 0.52mmt as it lost market share in China and South Korea in February.

Elsewhere in the Pacific, Russia's Sakhalin-2 LNG also saw a steep drop in exports. The plant slashed shipments by 0.29mmt (-26 percent) to 0.83mmt in February from 1.12mmt in January. The reduction mainly derived from fewer exports to the Far East, with only shipments to China remaining steady. In contrast, Peru's Pampa Melchorita plant increased exports by 0.06mmt (20 percent) to 0.36mmt in February from 0.30mmt in January, helped by increased shipments to South Korea.

Incremental LNG Exports by Country Relative to January (MMt)



Source: LNG Journal

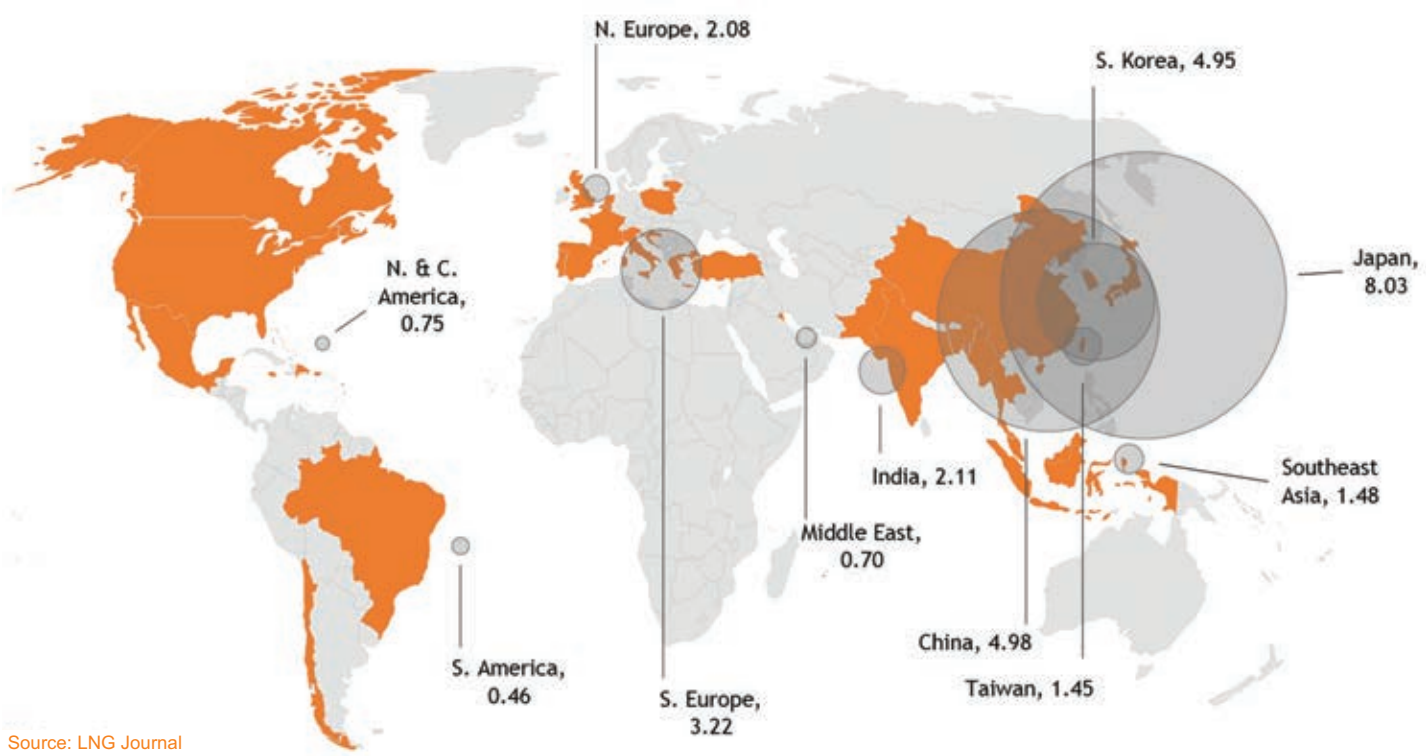
Atlantic Basin

The Atlantic Basin's overall shipped LNG volumes decreased by 2.28mmt (-20 percent) month-on-month in February. This led to a fall in export capacity utilisation by 15pp to 61 percent.

The overall amount of LNG shipped from Europe and Africa (not including re-exports) saw a net decrease of 0.07mmt (1 percent) month-on-month in February. Notably, demand for regional exports to the Far East was down by 1.08mmt (-71 percent), although an additional 0.54mmt ostensibly remained en route to the Pacific but still had to declare their destination at the time of writing. Export growth of 0.10mmt (10 percent) to Northern Europe also helped to cushion the net decrease. Overall, export growth in Algeria, Cameroon and Equatorial Guinea was instrumental in partially compensating for fewer exports by Russia, Nigeria and Angola, which in total removed 0.32mmt from the trade balance. The protracted market absence of Norway's Snøhvit LNG further worked to cement February's net export decrease from Africa and Europe.

It follows that the Atlantic's LNG export decrease was mainly driven by the western half of the Basin, where shipments were down by 2.21mmt (-33 percent) in February from 6.78mmt in January. In the United States, shipments decreased by 1.83mmt (-30 percent) to 4.18mmt in February from 6.01mmt in January. Sabine Pass LNG led last month's decrease in US LNG shipments with a reduction of 0.67mmt (-29 percent) to 1.62mmt. Freeport LNG and Corpus Christi LNG, meanwhile, slashed shipments by 0.65mmt (-50 percent) and 0.31mmt (-33 percent), respectively. Cameron LNG, meanwhile, curtailed shipments by 0.28mmt (-27 percent). The remaining US LNG plants – Cove Point LNG and Elba Island LNG – on the other hand, more than cancelled each other out, with Cove Point reducing exports by 0.08mmt and Elba Island LNG making a market return with 0.16mmt. US LNG shipments were once again hampered by bad weather, with a sudden drop in temperatures curtailing energy and feedgas flows. Market visibility at the time of writing indicated US LNG exports to the Far East suffered the most, decreasing by 2.16mmt in February. We

Global LNG Imports (MMt)



Source: LNG Journal

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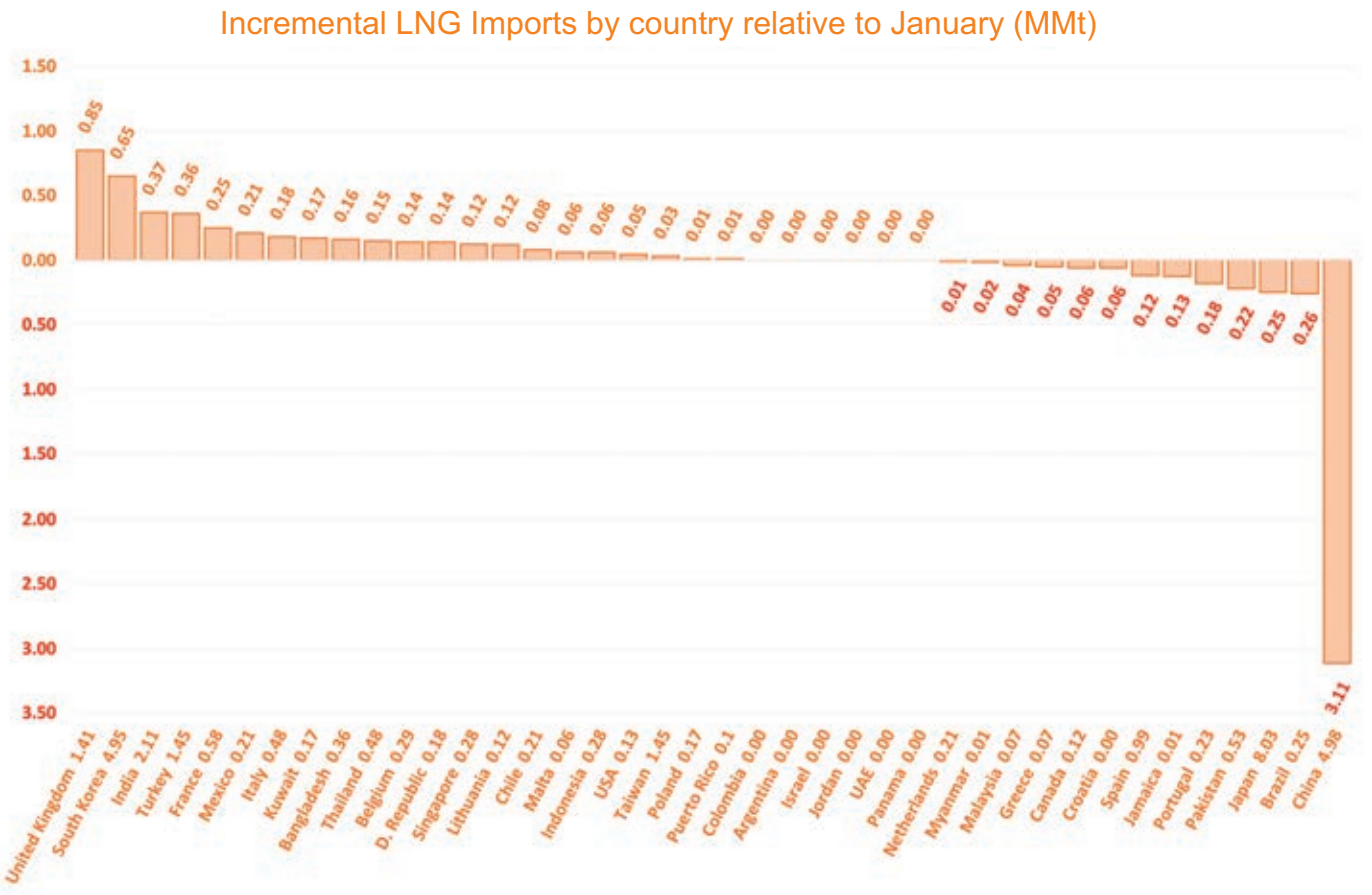


Source: LNG Journal

think this is a consequence of both curtailed US supply and Asian demand as concurrent US exports to Europe went up by 0.25mmt (19 percent).

In South America, Atlantic LNG in Trinidad & Tobago did not continue with monthly export growth, climbing down from 0.77mmt in January to 0.47mmt (-39 percent) in February. The plant's exports had grown between November and January. Atlantic LNG shipments were most affected by a reduction in Caribbean demand by for its gas by 0.14mmt as well as lower exports to Europe by 0.11mmt.

Middle East

February shipments from Middle Eastern plants decreased by 0.71mmt (-8 percent) from 9.30mmt in January to 8.59mmt in February. Middle Eastern exports were weighed down by Qatar curtailing shipments alongside its fellow regional producers in Oman and the UAE. In contrast, Egypt kept ramping up production but of course did not have sufficient balancing capacity. As such, the Basin's utilisation of operational export capacity (i.e., excluding Yemen) dropped by 10pp to 110 percent in February.

Once more the massive size of the Ras Laffan LNG complex was the determining factor in the degree of overall monthly change to Middle Eastern LNG supply. Qatar's February exports fell by 0.76mmt (-10 percent) to 6.58mmt following a robust expansion to 7.34mmt in January. However, the Ras Laffan LNG complex thus continued to operate at full capacity last month. Significantly lower demand for Qatari gas in the Far East in particular weighed on the country's LNG shipments, having decreased by 2.07mmt (-42 percent). Meanwhile, European offtakes returned to month-on-month growth albeit to a comparatively moderate extent of 0.24mmt (26 percent)

The other active producers on the Arabian Peninsula – Oman and the UAE – saw an overall export decrease of 0.17mmt (-11 percent), led by Oman. Although the country's LNG managed to gain significant traction in India on growth of 0.21mmt (420 percent) to 0.26mmt, market share in the Far East dropped by 0.44mmt (-46 percent) on lower Japanese and lacking Chinese and Taiwanese demand. The UAE also decreased its exports by 0.02mmt (-4 percent) in February as returning demand for its gas in Pakistan could not compensate for a loss in Pacific Basin market share.

In contrast, Egypt continued to ramp up exports in February – mainly via the Idku LNG plant but also through the return of Damietta LNG, which restarted shipments on 23 February. Accordingly, Egyptian exports expanded by 0.22mmt (46 percent) last month.

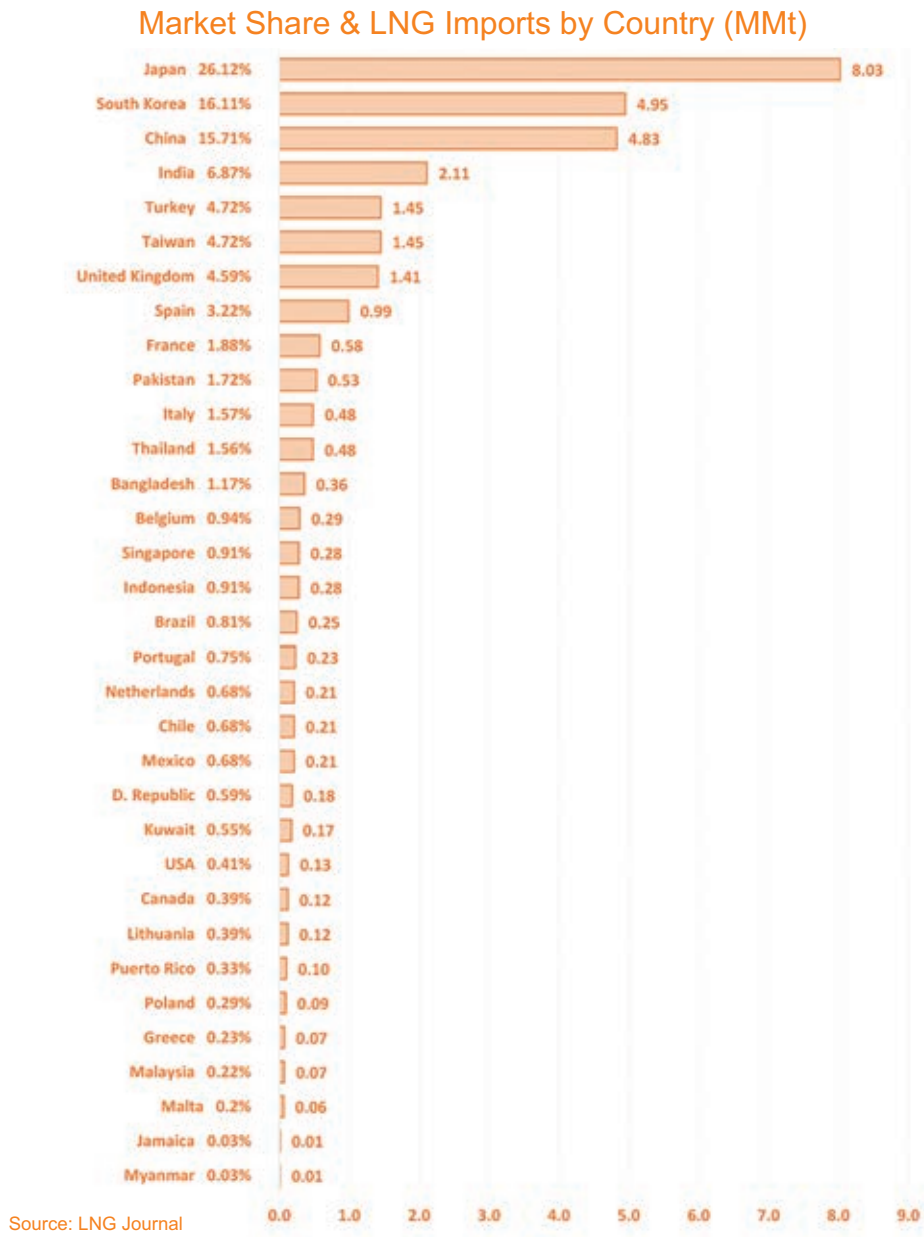
Imports & Domestic Trade

Global LNG offtakes suffered from lower Pacific Basin demand, where imports dropped by 1.83mmt (-7 percent) from January to reach 23.72mmt in February. This was contrasted, however, by a significant demand increase in the Atlantic Basin – where offtakes grew by 1.43mmt (26 percent) – whilst seasonally subdued demand of just 0.70mmt continued in the Middle East.

Pacific Basin

Pacific Basin imports did not continue to grow in February, decreasing by 1.90mmt (-7 percent) to 23.57mmt from the 25.47mmt seen in January. The commensurate overall import capacity utilisation thereby also decreased by 5pp to 62 percent. Overall Pacific imports were weighed down by China and Japan, which were leading February's negative demand growth within the Basin, as well as Malaysia's demand. Together, these importers decreased LNG offtakes by 3.36mmt on combined imports of 13.00mmt. This demand curtailment in the Far East was only tempered by higher South Korean demand, which rose by 0.52mmt (12 percent) to 4.95mmt.

Elsewhere in the Pacific, India grew monthly offtakes by 0.50mmt (29 percent) to 2.24mmt. As a prominent emerging LNG demand centre in South Asia, India's LNG offtake therefore continued with significant month-on-month growth similar to the 0.39mmt (21.1 percent) seen in October last year. India thereby discontinued a string of monthly demand reductions as the steep offtake increase in the Far East had caused LNG spot prices to rise between November and January. However, will also highlight the likelihood of the Brent price rally since November to continue to push up prices for Indian LNG imports via long-term, Brent-linked contracts.



Source: LNG Journal

Finally, Indonesia continued to see demand expand by 0.06mmt (27 percent) to 0.28mmt whilst Taiwan increased offtakes slightly by 0.03mmt (2 percent) to 1.45mmt.

Meanwhile, the roster of typically price-conscious Pacific buyers – including Bangladesh, Thailand, Chile, Mexico, Singapore and Myanmar – collectively boosted imports by 0.58mmt (64 percent) to 1.48mmt in February. This was primarily due to Thailand boosting offtakes by 0.21mmt whilst Chile and Mexico also each imported one cargo of 0.08mmt more compared to January. Meanwhile, Bangladesh and Singapore increased imports by 0.10mmt and 0.12mmt, respectively. Following a ramp-up of LNG imports up to December, however, Myanmar continued to curtail offtakes in February, which were down 0.01mmt from the 0.02mmt seen in January. Our data indicate Thanlyin LNG's operator VPower has been trying to source a cargo since the beginning of the new year, with the LNGC Methane Rita Andrea only arriving off Myanmar with a Petronas-sold cargo on 1 March.

Atlantic Basin

In contrast to their Pacific equivalents, LNG imports in the Atlantic Basin increased significantly by 1.35mmt (20 percent) as they climbed from 5.54mmt in January to 6.89mmt in February. The Basin's overall capacity utilisation thereby also increased by 6pp to 30 percent.

The Atlantic Basin's offtake increase was driven by net European demand growth of 1.47mmt (33 percent) month-on-month in February. European demand expanded as the United Kingdom, Turkey, France and Italy in particular boosted imports by 1.64mmt combined. Malta, Lithuania and Belgium also imported 0.32mmt more overall compared to January. Accordingly, these increases more than offset negative growth elsewhere in Europe in net terms. This negative growth was primarily caused by lower Portuguese and Spanish demand, which together decreased European imports by 0.30mmt. Concurrently, Poland and Greece also saw demand decrease by a total of 0.06mmt in February.

As to demand in the western Atlantic Basin, importers in the Caribbean and South America – comprising Brazil, Jamaica, Puerto Rico and the Dominican Republic – saw monthly net LNG demand decrease by 0.12mmt (-12 percent) overall in February and thus continued month-on-month negative growth from January. Argentina, Colombia and Panama again were not seen in the market. In North America, meanwhile, a 0.06mmt (-33 percent) demand decrease by Canada to 0.12mmt was by and large offset by a 0.05mmt (57 percent) demand increment to 0.13mmt in the United States.

Middle East

The Middle East continued to see a seasonal offtake reduction, which at 0.05mmt (-7 percent) less month-on-month accelerated in February compared to the 0.04mmt (-5 percent) decrease in January. In December last year, regional offtakes had decreased by 0.27mmt (-25 percent). Notably, Pakistan slashed monthly imports by 0.22mmt (-29 percent) from 0.75mmt in January to 0.53mmt in February. This was only partially offset by Kuwaiti imports amounting to 0.17mmt last month. The country did not appear in the market during January, having imported 0.12mmt in December. In line with the change in season and resulting cooler weather, the region has seen monthly demand shrink since September. Accordingly, Dubai's DUSUP, which had been important for regional LNG offtake growth during the summer, did not import LNG in February and thus did not add to the month's balance. Jordan's Aqaba LNG and Israel's Hadera Gateway terminal were also not seen in the market. Accordingly, Middle Eastern import capacity utilisation continued to see a reduction of roughly 1pp to 24 percent in February. ■

'Green LNG' trend turns natural gas into primary fossil fuel of the 21st century

In its Global Gas Outlook 2050, the Gas Exporting Countries Forum (GECF) says natural gas will become "the primary fossil fuel of the XXI century" by 2050 – helped by the growing demand for carbon-neutral or 'green LNG' as the energy transition progresses.

"Top LNG producers, traders, and consumers have made plans to decarbonise the LNG supply chain either by offsetting emissions from individual cargoes or by building low-emission liquefaction terminals," Dr Hussein Moghaddam, senior energy analyst at the GECF's Energy Economics and Forecasting Department told *LNG Journal* Markets Editor Anja Karl

Demand for natural gas is expected to rise by 50 percent from 3,950 billion cubic metres (bcm) in 2019 to 5,920 bcm in 2050, as gas remains the cleanest-burning hydrocarbon. Carbon-neutral or 'green LNG' will help accelerate the energy transition.

Dr Hussein Moghaddam, Senior Energy Analyst, GECF Secretariat

"Green gas," in this context, indicates a reduction or offset of greenhouse gas emissions linked to some, or all elements of the LNG value chain – from production of upstream gas and pipeline transportation, to liquefaction, transportation, regasification, and downstream utilisation of natural gas. Companies have various options to reduce emissions, e.g. by using biogas as feedstock; decreasing emissions from upstream through carbon capture and storage (CCS), by minimizing emissions during gas transport, or by making use of renewable energy to power their liquefaction plants. However, carbon-neutral does not mean that the LNG cargo generates zero emissions, rather that LNG sellers can counterbalance their emissions by obtaining offsets or carbon credits which reinforce reforestation or other environmental projects.

"Leaders of the G20 endorsed the concept of the circular carbon economy and the GECF is the part of this process," Mr. Moghaddam said, explaining the circular carbon economy aims to include technologies such as CCS/CCUS as a way to promote economic growth and to manage emissions in all sectors. However, it is still unclear which part of the LNG value chain should take responsibility to offset emissions. Legacy projects often have limited means to decrease carbons and LNG producers have to keep the balance between the competitive fuel pricing and the expensive emissions reduction initiatives. So the question is: Who pays the additional costs to produce Green LNG?

"The GECF proposes sellers and buyers have to contribute to achieving emission targets. The discussions with respect to these issues should involve all LNG industry players," Mr. Moghaddam stressed, indicating "a more focused perspective that targets minimising emissions in upstream and liquefaction might be more feasible for LNG producers."

Qatar Petroleum turns to CCS to cut emissions by 25%

The largest player in the Middle East, Qatar Petroleum is applying a combination of strategies to reduce its emissions; for example, it is building a CCS facility alongside its 126 million tons per annum (mtpa) liquefaction capacity expansion by 2027. As part of its new sustainability strategy, the Doha-based company announced plans to reduce the emissions intensity of its LNG facilities by 25 percent by 2030.

The capture and storage of CO2 from Qatar Petroleum's LNG facilities of about 7 mtpa by 2027 is another goal. Furthermore, the company aims to drop emissions at its upstream facilities by at least 15 percent, as well as cut flaring intensity by over 75 percent by the end of this decade. By 2030, Qatar Petroleum is attempting to abolish routine flaring, and by 2025, it would like to minimise fugitive methane emissions along its gas value-chain by establishing a methane intensity target of 0.2 percent over all of its facilities.

In certain gas supply contracts, Qatar Petroleum has already incorporated some green elements. In November 2020, Qatar Petroleum signed the first long-term deal with "specific environmental criteria and requirements", which was designed to minimise the carbon footprint of the LNG supplies with Singapore's Pavilion Energy, and to provide 1.8 mtpa of LNG over a 10-year period.

Several oil and gas majors embrace CCS, for example in Western Australia, where Chevron owns and operates the 15.6 mtpa Gorgon LNG and has injected more than 4 million tonnes of CO2 in the CCS facility since its commissioning in August 2019.

Novatek blends H2 with LNG exported from Yamal

Novatek, meanwhile, has set a target to reduce methane emissions per unit of production by 4% in the production, processing and LNG segments. The Russian independent gas exporter also aims to lower greenhouse gas emissions per tonne of LNG produced by 5 percent.

In this regard, Novatek and Baker Hughes, which provides engineering and turbomachinery at Yamal LNG, signed an agreement to introduce hydrogen, or H2-blends rather than solely running methane from feed gas into the main process for natural gas liquefaction in order to reduce CO2 emissions from Novatek's liquefaction and export facilities.

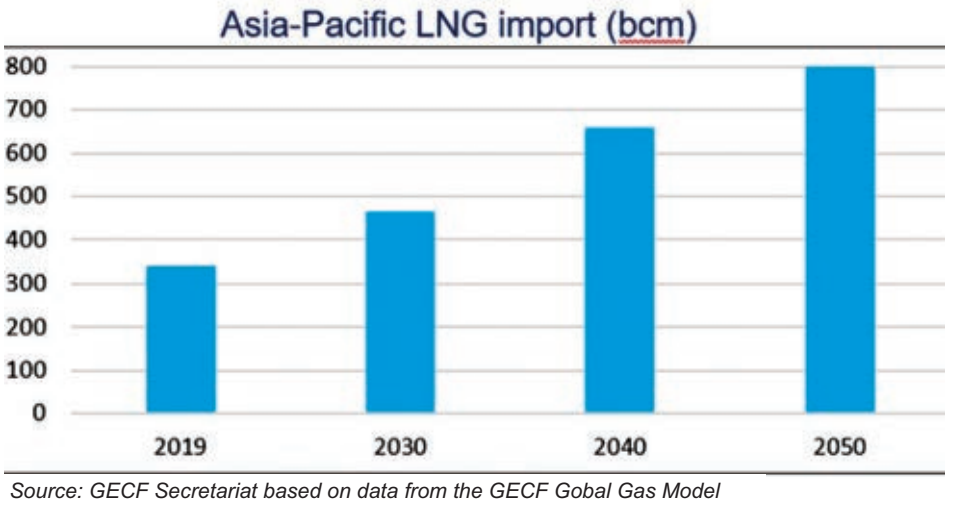
In the Netherlands, bio-LNG is bound to play a significant role both in the heavy vehicle and maritime transport sector. Construction of the first Dutch bio-LNG installation started in Amsterdam in November 2020, developed by the Renewi, a waste management company, which alongside with Nordsol will processes the biogas into bio-LNG, for Shell to then sell the bio-LNG at its LNG filling stations. Biogas is made up of roughly 60 percent methane and 40 percent CO2, but the carbon content can be further reduced by recycling of the CO2 as a by-product in the market.

Inpex, Japan's biggest oil and gas producer, has recently disclosed its strategy to become a CO2 net-zero company by 2050 by developing its renewable and hydrogen energy together with the utilisation of carbon capture technologies. Japan has also stated in October 2020 that the country would become carbon-neutral by 2050.

Japan and S'Korea aim for a 'decarbonised society'

"As concerns with air quality rise in numerous Asian countries, the most realistic solution to attain a decarbonised society in the future by minimising the level of CO2 on a global scale, is the combination of natural gas and renewable energy. Thus, emissions and cleaner-burning fuels are going to be the centre of attention," Mr. Moghaddam noted. According to the 2020 Edition of the GECF Global Gas Outlook 2050, LNG imports to Asia are forecast increase to about 800 bcm, or 585 million tons by 2050. With 71 percent of global LNG imports, the region is set to be the driving engine for global LNG demand growth.

But the centre of demand for 'green LNG' lies elsewhere: "Europe could be the predecessor for carbon-neutral LNG in the long-term, by sticking to its new methane strategy and 2050 carbon-neutral goal," he said. "Important, in this regard, is the political push of the European Commission towards LNG producers who are told to explore possible standards, targets, or incentives for clean energy supplies to the EU." ■



Source: GECF Secretariat based on data from the GECF Gobal Gas Model

For the Record

ADRIATIC LNG, the offshore import terminal owned by Qatar Petroleum and ExxonMobil, has launched a consultation for the auctioning of a potential 153 billion cubic metres of regasification capacity over the next 25 years. Interested parties have 45 days to submit observations on products and allocation rules. Adriatic LNG has been operating since it was deployed in 2009 on a gravity-based structure off the coast of the Veneto region. The operating company said the subjects of the two-fold consultations are, on the one hand, the products to be allocated and, on the other hand, the amendments to the Regasification Code needed to carry out the open season. "With the public consultation we take a further step to create one of the most important events for the entire energy market of the Mediterranean area," said Sebastien Bumbolo, Adriatic LNG Law & Market manager. "The latest developments in the regulatory framework implemented in Italy have new rules on the allocation of LNG regasification capacity which have already been successful in other European Countries," added Sebastien Bumbolo. "Adriatic LNG is able to offer to the market large volumes through long-term allocations," he stated.

The joint venture operating company is controlled by ExxonMobil Italiana Gas and Qatar Terminal Ltd and a third shareholder is the Italian natural gas grid operator, SNAM, with a 7.3 percent stake. Adriatic LNG has contributed to satisfying Italy's gas security by already delivering 69 Bcm of regasified LNG into the national pipeline network. Cargoes of LNG have been received at the Adriatic facility from eight nations, Angola, Qatar, Egypt, Trinidad and Tobago, Equatorial Guinea, Norway, Nigeria and the US. The company said all gas and LNG market players, both at national and international levels, have access to the Adriatic LNG proposals and can send their observations by March 22nd, 2021.

AIR PRODUCTS, the world's leader in liquefied natural gas technology and equipment, has signed an agreement to provide propriety equipment and a related process license to the Sempra Energy Mexican LNG export plant at Costa Azul on the Pacific Coast. "The Air Products manufacturing facility in Port Manatee, Florida will manufacture the coil wound heat exchangers (CWHE) for its LNG process technology, which will then be shipped to the project export terminal site in Ensenada in Mexico," said Air Products, based in LeHigh Valley in Pennsylvania. The Mexican plant development is a joint venture involving Sempra, its Mexican subsidiary IEnova and European energy company Total. TechnipFMC, the Franco-US company, received a notice to proceed for its Costa Azul LNG engineering, procurement and construction contract in. November 2020. "ECA LNG is a new customer for Air Products' LNG business, and we are pleased our AP-DMR process technology was selected to assist them in meeting their LNG business goals for the first phase of this strategic west coast North America LNG project," said Samir J. Serhan, Chief Operating Officer at Air Products. "This project will showcase the innovative benefits of our technology, as it will utilize our highly efficient and cost effective dual mixed refrigerant (DMR) process for this unique, compact site location," explained Serhan. "Our recently expanded manufacturing facility can serve all customer needs in terms of LNG production capacity and reinforces our commitment and presence to serve all the LNG markets worldwide, from baseload mega-Trains to mid-scale bunkering facilities to small-scale facilities," stated the COO.

The LNG equipment from Air Products is aimed at enabling around 3 million tonnes per annum of LNG at the Ensenada location, which is an existing import terminal. "Under the agreement, Air Products' DMR process technology, as well as engineering, design and manufacturing of the heat exchanger equipment for the liquefaction section, will be supplied for the single production Train," said the company. "This DMR process is particularly well suited for not only this land-based baseload LNG facility in Mexico, but also for Arctic locations and for offshore, floating LNG applications," it added. The Air Products Port Manatee plant for LNG heat exchangers, which it opened in January 2014, completed a 60 percent expansion in October 2019 to meet growing demand. TechnipFMC's scope of work for the Costa Azul facility is to add nameplate capacity of 3.25 to the existing regasification terminal using a compact and high efficiency mid-scale LNG design.

This addition will allow for natural gas liquefaction and LNG export capability at the Costa Azul facility, which has been operating as a regasification terminal since 2008. ECA LNG is one of Sempra LNG's strategically located natural gas liquefaction infrastructure projects currently in development in North America. Sempra operates the Cameron LNG plant in Louisiana and also hopes to develop the Port Arthur liquefaction facility in Texas. TechnipFMC has been involved in the Costa Azul project since 2017, including the delivery of the front-end engineering and design. The Costa Azul work will be carried out by the Technip Energies division of TechnipFMC, which is currently undergoing a spin-off process under which the business for LNG projects will be separated from the Houston-based Subsea and Surface Technologies units.

BP has sold a 20 percent stake for $2.6 billion to Thailand's national energy company in key tight natural gas fields onshore the Sultanate of Oman that enabled the Arabian Peninsula nation to stabilize then boost LNG exports over the past three years. Under the deal with Thailand's PTT Exploration and Production Public Company (PTTEP), BP will remain operator of Block 61, with a 40 percent interest as it continues its selective divestment programme. Block 61, covering around 3,950 square kilometres in central Oman, contains the largest tight-gas development in the Middle East. The block has already had two phases of development, the Khazzan field, which began production in 2017, followed by the Ghazeer field in October 2020. "These two developments, targeted at a total of 10.5 trillion cubic feet of gas resources, have a combined daily production capacity of 1.5 billion cubic feet of gas and more than 65,000 barrels of condensate," explained BP. "Gas from Block 61 is exported for domestic consumption into Oman's national gas grid, while also boosting availability of feedstock supply for Oman LNG," said the London-based major.

BP Trading and Shipping purchases cargoes from Oman LNG under a seven-year deal that started in 2018. Oman is also planning to become a major LNG bunkering nation from its port at Sohar in cooperation with French major Total. The main Omani LNG export facilities are at the port of Sur and send cargoes to nations such as Japan, South Korea and into the spot market. The plant comprises the three amalgamated liquefaction Trains of Oman LNG and Qalhat LNG, now producing more than 10 million tonnes per annum. A de-bottlenecking project, whereby better output can be achieved by fixing inefficiencies, both technical and operational, is increasing Oman's LNG output to 11.5 MTPA or more.

BP Chief Executive Bernard Looney said he was pleased to welcome Thailand's PTTEP to the successful Block 61 partnership. "Block 61 is a pioneering development that has applied leading techniques and technologies to maximise efficiency and minimise emissions," added Looney. "We are committed to BP's business in Oman and this agreement allows us to remain at the heart of this world-class development while also making important progress in our global divestment programme," stated the CEO. The other shareholders in Block 61 are Oman Oil with 30 percent and Malaysia's Petronas with 10 percent. BP said it was targeting divestment proceeds of $25Bln by 2025 and most recently completed the sale for $5 billion of the petrochemicals business to INEOS.

CHEVRON Corp., one of the leading global liquefied natural gas operators, will have continued lower output at the Gorgon and Wheatstone LNG plants in early 2021 and explained plans for the Permian Basin in Texas in the light of the new US regime for curtailment of the oil and gas industry by means of executive orders. Chevron made its comments through Chief Financial Officer Pierre Breber and Chief Executive Mike Wirth in a conference call with analysts after the San Ramon, California-based major issued its fourth-quarter earnings with a net loss for the three months of $665M and full-year 2020 losses of $5.5Bln. "Gorgon Train 1 repairs are nearing completion, and we expect the facility to be back online in March," said CFO Breber. "After Train 1 is back online, Train 3 will be taken out of service for the propane vessel inspections, any repairs and the planned turnaround," he explained. "At Wheatstone, production is modestly below capacity while we repair an inlet separator," stated Breber.

Chevron reported that included in the 2020 full-year earnings were net charges for special items of $4.5Bln, compared with net charges of $8.7Bln for special items in 2019. In the quarterly report there was a charge of $120M for expenses related to the completion of the takeover of Noble Energy, the Houston-

based company acquired by Chevron in 2020 for its onshore US assets and its natural gas holdings offshore the East Mediterranean and West Africa. CEO Mike Wirth also commented on the Gorgon and Wheatstone outlooks for the first couple of quarters of 2021. "Wheatstone, for the rest of the year, should be back up to full capacity until a turnaround that begins late third quarter and runs into fourth, which we'd already planned and announced," explained Wirth. "And then, of course, at Gorgon, as Pierre mentioned, Train 3 will have inspection of these propane exchangers and a planned turnaround here in the second quarter of this year," added the CEO. "So we will be lighter on Australia production, but a big part of that is planned turnaround activity and then there's an increment related to these repairs," said Wirth. He added that on Australian LNG about 80 percent of output is subject to long-term contracts and revealed that Chevron had also been trading more in the spot cargo market as operating capacity has also been at just 80 percent. "So we've been able to satisfy all of our term needs, and we're in the market now with our commercial organization, buying a cargo here, selling a cargo there in and out of the spot market," explained Wirth. "But we haven't been out of position and hurt because we had to buy high and sell low to any meaningful degree through this whole cycle," the CEO stated.

Wirth noted that in the Permian Basin, Chevron was thinking about several issues. The CEO explained that as he looked at some of the announcements and developments that seem to be unfolding here in the US, it's "early days to understand exactly how these will play out" in reality. "The executive order (on permits on Federal lands) was sweeping and broad, but it also lacks some specificity,' said the CEO. "And I think, certainly, as you listen to some of the members of the new Administration comment, as they introduce this and answered some questions, I think they're looking to flesh out the details in the coming weeks and months," added Wirth. "Onshore in the Permian, we're weighted toward Texas more so than New Mexico," he said.

Analysts note that the state of New Mexico depends more on state income from exploration and production licences on Federal land than any other state by proportion versus size and will be badly hit. "We're weighted toward private land more so than Federal land. So we've got a fair degree of flexibility there, and that remains a highly attractive place for us to step capital up as we have the capacity to do so and the market conditions support it," said Wirth. "So I think the Permian equation looks pretty similar to what it did at the time we made those statements. Deepwater Gulf of Mexico, I think we just have to see how this unfolds. And certainly, we like the projects that we're advancing here. And there's been, I think, general signalling that existing leases are secure," he added. "Overall, Permian production will be up because we've added production from Noble. I think we've previously guided to kind of a 6 percent to 7 percent decline on the Chevron legacy production," he explained. "That actually, today, looks like it will be a little less steep, maybe more like a 5 percent decline on Chevron legacy production in 2021 versus 2020. And that's with flat activity levels, running five rigs and one or two completion crews over the course of the year," the CEO said. "Our projected growth is driven by a full year of production from the Noble Energy assets and lower expected curtailments," said Wirth.

EDGE LNG, a US company involved in delivering LNG to market by converting stranded and flared natural gas, has unveiled its new facility in Midland in Texas to meet growing demand for its services. The new premises will hold operating equipment of both Edge LNG and Galileo Technologies, it's exclusive technology partner, and will additionally be home to the first training center for both companies. Located in the heart of the Permian Basin, the 10,000 square feet premises allows Edge LNG access to all major transport links which are vital in the transportation of LNG. The new site will act as a focal point for Edge LNG's Permian operations, bringing the company closer to its customers.

It will allow customers to see equipment first-hand and offer the opportunity to attend training sessions to better understand the company's business model and operations. "This is an exciting time for the LNG market and after a challenging year we are seeing growth in the Permian," said Jonathan Brignac, Vice President of Business Development at Edge LNG. "Not only does the opening of our facility underline our commitment to our customers, it highlights our commitment to the Permian, where we see so much opportunity and potential to expand our business," added Brignac. "Our investment here allows us to provide a cleaner alternative to diesel for operators, replace the need for flaring or venting and unlock the potential of stranded wells," he explained.

Edge LNG has marketed the trade-marked Cryobox-Trailer, designed and manufactured by Galileo Technologies. Each unit can produce around 10,000 gallons (15 metric tons) of LNG per day, directly from the well or flare. Galileo Technologies is both an investor and exclusive technology partner of Edge LNG. Edge LNG said its new office is located at 6412 S County Road in Midland. The company said its proven Cryobox technology is ideal for mobile liquefaction and is delivered by trailer. Each Cryobox unit can begin production within hours and can convert 1 million BTU of gas per day. Founded in 2018, Edge LNG's unit, Edge Gathering Virtual Pipelines 2 LLC, purchases the Cryobox units directly from manufacturer Galileo Global, which is also a shareholder.

ENERGY TRANSFER LP**,** based in Dallas, Texas, has agreed to acquire Enable Midstream Partners in an all-shares transaction valued at around $7.2 billion, further enhancing Energy Transfer's connectivity to the LNG export market along the US Gulf Coast. The two largest unit-holders of Enable, OGE Energy Corp. and CenterPoint Energy Inc. (CNP), have entered into support agreements on the deal with Energy Transfer. Energy Transfer, which like Enable is listed on the New York Stock Exchange, owns and operates one of the largest and most diversified portfolios of energy and pipeline assets in the US. Energy Transfer, through its ownership of Energy Transfer Operating L.P., additionally owns Lake Charles LNG Company in Louisiana, expected in the future to become an export facility. Enable is based in Oklahoma City and owns and operates natural gas and crude oil infrastructure assets. Enable owns around 14,000 miles of natural gas, crude oil, condensate and water-gathering pipelines and about 2.6 billion cubic feet per day of natural gas processing capacity.

Its portfolio includes 7,800 miles of interstate pipelines, 2,200 miles of intrastate pipelines and seven natural gas storage facilities with capacity of 84.5 billion cubic feet. Energy Transfer said that under the terms of the agreement, Enable common unit-holders would receive 0.8595 ET common units for each Enable common unit. In addition, each outstanding Enable Series A preferred unit would be exchanged for 0.0265 Series G preferred units of Energy Transfer. The transaction will include a $10 million cash payment for Enable's general partner. "Energy Transfer will significantly strengthen its natural gas liquids infrastructure by adding gathering and processing assets in the Anadarko Basin in Oklahoma and integrate high-quality assets with Energy Transfer's existing NGL transportation and fractionation assets on the US Gulf Coast," said Energy Transfer. "The acquisition will also provide significant gas-gathering and processing assets in the Arkoma basin across Oklahoma and Arkansas, as well as the Haynesville Shale in East Texas and North Louisiana," it added.

Energy Transfer explained that Enable's transportation and storage assets would enhance its access to core markets with consistent sources of demand and bolster its portfolio of customers anchored by large, investment-grade companies and their firm, long-term contracts. "The all-equity nature of the transaction allows unit-holders of both partnerships to participate in the value creation potential of the combined partnership," said Energy Transfer. Enable's transportation and storage assets are also seen as improving the Dallas company's access to core markets with consistent sources of demand. "Energy Transfer will further enhance its connectivity to the global LNG market and the growing global demand for natural gas as the world transitions to cleaner power and fuel sources," said the Energy Transfer statement.

Energy Transfer expects the combined company to generate more than $100 million of annual run-rate cost and efficiency synergies, excluding potential financial and commercial synergies. Potential commercial synergies include significant incremental earnings, which may result from integrating Enable's Anadarko gathering and processing complex with Energy Transfer's fractionation assets on the US Gulf Coast.

ENERGY WORLD Corp., the Australian-listed power project developer in southeast Asia, has managed to get its liquefied natural gas and power venture on the South Sulawesi coast of eastern Indonesia back on track after a ruling from regulators. EWC's Indonesian project, called South Sulawesi LNG (SSLNG), involves a 315 megawatts gas-fired power

plant at Sengkang and an affiliated LNG production plant with output of 2 million tonnes per annum. "The Directors of EWC are pleased to announce the Planology Department of Ministry of Forestry have formally completed the review of the historical land documentation and the remapping of the land area which was incorrectly claimed to be forestry land in June 2017," the company explained in a filing to the Australian Securities Exchange. "PT SSLNG have now been advised that the land upon which we have constructed the mid-scale modular LNG facility has been re-confirmed by all the relevant authorities as industrial land and after a four-year delay," added EWC. "We have now been encouraged to recommence our project construction and the related commercial discussions associated with the project financing and the offtake of LNG from the plant," said the statement from Brian Allen, Executive Director of EWC.

Allen stated that the ruling shows the company properly purchased industrial land and built the plant on industrial land. "This is consistent with the documentation we possess and the permitting we originally received to allow the commencement of the plant construction until, we were advised, wrongly, that the plant was being built on forestry land and to halt all site activity and construction," said Allen. EWC had previously been granted a 20-year extension to its Indonesian natural gas production-sharing contract. EWC has its Australian headquarters at Seaforth, a suburb of Sydney in New South Wales. The company reiterated that the LNG facility was substantially complete and has been funded at project level with equity from EWC. A total of US$343 million has been invested in the project to date (excluding finance and soft cost).

Allen said that a further US$35-US$50M would be required to bring the first 500,000 tonnes per annum of LNG production on-line. "We are confident that we will finance this with project debt. With the first 500,000 tonnes per annum, we expect the project to expand rapidly to 2 MTPA capacity using funds generated from LNG sales," he added. EWC said that now that the land has been re-certified, all efforts will be applied to completing the project as expeditiously as possible. While some aspects of the project were still subject to some negotiation with third parties, EWC expects that first LNG sales could take place in about 18-24 months. "EWC would like to take this opportunity to express their appreciation and thanks to the various Indonesian Government departments and officials in Wajo and Makassar in South Sulawesi and in Jakarta for their due diligence procedures on this development and for their guidance and support throughout this whole remapping process," said EWC.

Allen added that the resolution of the land matter, combined with the recent award of a 20-year extension to its gas operations in South Sulawesi, now placed EWC in a position to fully develop the commercial opportunities previously foreseen. EWC is also pursuing the development an LNG hub in the Philippines. The company recently said that the completion of the Philippines terminal in Quezon Province had been delayed by the Covid-19 pandemic. The ongoing lockdown had affected its ability to carry out normal site operations at the hub site in Pagbilao. EWC's Pagbilao terminal is largely completed. The company was given a licence in 2019 to operate the terminal and to construct some other facilities before it becomes operational. The permit allowed a further construction period of 24 months. EWC explained that the permit would enable the start of operations of the first LNG storage tank at Pagbilao to be aligned to the commercial start-up of the associated 650 MW gas-fired power plant. EWC is one of several companies developing LNG-for-power projects in the Philippines. First Gen Corp., the largest provider of gas-fired power in the country, is developing a fast-track floating terminal to bring LNG to the Philippines by 2022 at Batangas City in Luzon. In another possible venture, state-owned Philippine National Oil Company has signed an accord with US-based project company New Fortress Energy to study jointly developing LNG infrastructure.

ENI, the Italian energy company, said Egypt was on track to regain its former full LNG export capacity as the first cargo was shipped from the Damietta plant east of Alexandria, shut down in 2012, firstly because of feed-gas shortages and then from 2017 over a dispute among shareholders. Eni said the re-start was made possible after an agreement was reached in December 2020 aimed at settling all disputes between the shareholders linked to the long shutdown. "At this stage the agreement has already received all the authorizations of the competent authorities and its final closing is expected in the first half of March," explained Eni. "The agreement comes at an important moment, when also thanks to the fast time to market of Eni's natural gas discoveries, especially the ones in the Zohr and Nooros fields, Egypt has regained its full capacity to meet domestic gas demand and can allocate surplus production for export through its LNG plants," stated Eni.

With Damietta back on stream, Egypt can add 4.5 million tonnes per annum of output to its export volumes now totalling 12.5 MTPA. The move forward for Damietta came after the resolution of the long-standing dispute between the shareholders over contracts because of the closure. Naturgy, the Spain-based European utility, agreed to sell its stake in the Damietta plant and to rescind its Egyptian gas contracts on departing from the Unión Fenosa Gas (UFG) joint venture. Naturgy's UFG partners, Eni and the Egyptian Natural Gas Holding Company (Egas), reached the agreement under which Naturgy would receive a series of payments adding up to US$600 million. The Spanish utility is also receiving most of UFG's assets outside of Egypt as well as being released from the 3.5 billion cubic metres annual gas procurement contract to supply its gas-fired power stations in Spain, which was due to end 2029. Under the settlement deal, these Spanish interests are being taken over by Eni.

The Damietta LNG plant had been idle since November 2012 when Egypt suffered natural gas shortages. In addition to Damietta LNG, Egypt has a second export plant, the Idku facility operated by Royal Dutch Shell, and which has been back in commercial operation since 2017. As regards Damietta plant shareholdings, the Naturgy 80 percent in Damietta liquefaction was transferred with Eni receiving 50 percent and 30 percent going to EGAS. The resulting shareholding of the Damietta holding company sees Eni with 50 percent, EGAS holding 40 percent and Egyptian General Petroleum Corp. with 10 percent. Eni has also taken over the contract for the purchase of natural gas for the plant and receives corresponding liquefaction rights.

ENTREPOSE Contracting, a unit of Vinci Construction Grands Projets and the UK's Taylor Woodrow, has been awarded an engineering, procurement and construction contract by the UK's National Grid to build a liquefied natural gas storage tank to serve the import terminal for London. The companies will construct a 190,000 cubic metres capacity LNG tank at the Isle of Grain import terminal southeast of London, located on the Thames-Medway river estuary. All the companies involved in the LNG tank project are all Vinci Construction subsidiaries. "This project is part of the programme to expand the capacity of the largest LNG terminal in Europe, located on the Isle of Grain, on the East Coast of England, 60km from London," said Vinci.

Vinci said that the full containment tank will have a 9 percent nickel steel inner tank with a pre-stressed concrete outer shell, poured in-situ using slip-forming. The works, for a budget of €200 million ($243M), are set to continue until June 2025. Analysts note that LNG supplies to the Isle of Grain terminal are key to London's energy security as one shipment of LNG from a nation like Qatar can maintain the capital's power capabilities for at least five days. Vinci has already built about 20 LNG storage tanks worldwide over the past 15 years, including three which are still under construction, two in Russia with 160,000 cubic metres capacity each and one in Canada with 225,000 cubic metres capacity. "The Group is recognised for its capacity to meet the expectations of major players in the sector and confirms its leading position in the design-build of large-scale cryogenic storage tanks in any type of environment," said Vinci.

The UK regasification facility currently has 1 million cubic metres of LNG storage spread across eight tanks and an annual throughput capacity of 20 billion cubic metres of natural gas. With the terminal expanding its facilities with an additional tank and associated vaporizer capacity, its future annual throughput will increase to 25 Bcm of natural gas, or 18.5 million tonnes per annum of LNG. Qatar Petroleum announced in October 2020 that it had arranged storage and redelivery capacity for 25 years at Grain LNG. The deal was signed between the UK gas network operator National Grid and Qatar Petroleum's Qatar Terminal Limited (QTL) unit after the conclusion of an open season process.

EQUINOR, the Norwegian energy company, said it would write down the book value of its Tanzania LNG project in East Africa on the company's balance sheet by US$982 million. Equinor said the Tanzanian LNG joint venture write-down would be reflected in the fourth-quarter earnings report scheduled to be released on the 10th of February

2021. "While progress has been made in recent years on the commercial framework for TLNG, overall project economics have not yet improved sufficiently to justify keeping it on the balance sheet," explained Equinor. "The TLNG project has an anticipated break-even price well above the portfolio average for Equinor and is, at this time, not competitive within this portfolio," said the company. "Equinor will continue to engage with the Government of Tanzania in negotiations on a commercial, fiscal and legal framework that may provide a viable business case for TLNG in the future," stated Equinor.

While Tanzania's southern neighbour Mozambique is moving ahead with several LNG projects which will change the nation's economic profile, Tanzania's reserves are not large enough to excite the major oil and gas companies. Equinor has been present in Tanzania since 2007 when the company signed a Production Sharing Agreement (PSA) with Tanzania Petroleum Development Corp. (TPDC). Equinor is the operator with a 65 percent participating interest, while US major ExxonMobil has a working interest of 35 percent in the PSA. Tanzania Petroleum has the right to participate in any project and would have a 10 percent interest.

Equinor made nine natural gas discoveries in Block 2, one of four explored blocks with proven resources offshore Tanzania. The discoveries were made in 2011 onwards. The Basin and gas resources occupy an area of some 75,000 square kilometres between the Tanzanian continental shelf edge and an area 200km east of the coast in water depths ranging from 500 metres to 3,300 metres. Royal Dutch Shell became the operator of blocks 1, 3 and 4 in Tanzania in February 2016 after its takeover of BG Group and has also been working closely with Tanzania Petroleum. Net contingent resources in the four Blocks are estimated to be at least 20 trillion cubic feet, sufficient to support a three-Train LNG development.

GTT, or Gaztransport and Technigaz the French designer of liquefied natural gas maritime and onshore storage, has received approval for the No. 96 containment system application as an LNG fuel tank for Ultra-Large Container Vessels from the European classification society DNV GL as the number of LNG-powered ships increases. GTT and DNV GL reviewed the compatibility of the No. 96 technology within a container vessel hull to ensure that the integration of such a containment system would be fit for purpose. Under the Approval in Principle (AiP) procedure, a sloshing assessment of the containment system was also performed. "This approval by DNV GL now allows us to offer to the ship-owners two membrane technologies," said Philippe Berterottière, Chairman and Chief Executive of GTT. "GTT's Mark III technology has already been certified and now the No. 96 tanks, already used in over 200 LNG carriers, represent a reliable and competitive solution which is particularly well adapted to Ultra Large Container Vessel fuel tanks," explained Berterottière.

Ivar Håberg, Director of Approval of DNV GL, worked with GTT in the adaption of the tanks for fuel applications. "The availability of technology alternatives is important for our customers to accelerate the transition to more environmentally-friendly fuels," added DNV's Håberg. Among recent orders, GTT will equip ARC-7 ice-breaking LNG carriers for the Korean shipyard Daewoo Shipbuilding and Marine Engineering. That order came in December 2020 after receiving previous orders in October from a Russian shipyard. Three of the LNG vessels will be built on behalf of the Japanese ship-owner Mitsui OSK Lines and the other three on behalf of the Russian ship-owner Sovcomflot. GTT said each vessel will have a capacity of 172,500 cubic metres and be fitted with the No. 96 GW membrane containment system.

They will be delivered throughout 2023 and will operate as part of the Russian LNG producer Novatek's Arctic LNG II project. GTT's other orders for Russian-built vessels are from the Zvezda Shipyard in the Russian Far East, located at Bolshoi Kamen on the coast of the Sea of Japan and about 12 miles northeast of the city of Vladivostok. GTT said each Russian-built vessel would offer a capacity of 172,600 cubic metres capacity and be fitted with the Mark III membrane containment system.

HIRANANDANI Group of India and Höegh LNG of Norway have confirmed they are on track to deploy a floating import terminal in March 2021 to supply liquefied natural gas to the West Coast Indian state of Maharashtra and become to become nation's seventh terminal. Höegh LNG and Hiranandani Group subsidiary H-Energy have just completed and signed all documentation for the 10-year charter of the floating storage and regasification unit (FSRU), the "Höegh Giant". The agreement is for a period of 10 years with annual termination options after year five. "The 'FSRU 'Höegh Giant' is currently completing its LNGC charter with Spanish utility Naturgy, and will then proceed directly to Keppel Shipyard (Singapore) for minor modifications, in addition to pre-completion of the vessel's five-year periodic class survey, originally scheduled for 2022 as this will improve efficiency and reduce costs.," explained Höegh. "The vessel is expected to be off hire for approximately 40 days in the first quarter of 2021 before the start-up under the H-Energy contract in March 2021," added the Norwegian firm.

The Indian company is aiming to develop LNG regasification terminals and cross-country pipelines on the West and East coasts of India and is making a start with the FSRU at Jaigarh port. H-Energy's first vessel, the "Höegh Giant", was built in 2017 and has a storage capacity of 170,000 cubic metres and peak regasification capability of 750 million standard cubic feet per day to handle up to 6 million tonnes per annum of LNG. "The FSRU will deliver regasified LNG to the 56-kilometres Jaigarh-Dabhol pipeline connecting to the Indian National Gas grid and will also deliver LNG onshore for LNG truck-loading facilities," the companies explained. The FSRU will also deliver LNG for onshore distribution through LNG truck loading facilities, as well as reloading LNG onto small-scale LNG vessels for downstream distribution or LNG bunker services.

Höegh President and Chief Executive Sveinung J.S. Støhle said he was delighted to have completed the agreements with H-Energy for the first FSRU LNG import terminal in India. "A roadmap with H-Energy also includes the joint development of the downstream small-scale LNG market in the region, using the FSRU as the terminal for storage and re-loading to smaller vessels," added Støhle. "India is a high-growth market and we see clear potential for Höegh LNG to provide additional FSRUs and clean energy solutions to this market over the coming years," he stated.

HOGLUND MARINE, the Norwegian company specializing in both retrofit and newbuild projects, has signed a contract to supply an advanced LNG Fuel Gas Supply System for three German ships owned by the German Federal Government to be deployed in hazardous roles. The customised Fuel Gas Supply Systems (FGSS) have been developed to allow the LNG-fuelled vessels to take on hazardous roles such as pollution control, emergency towing and firefighting. Høglund, based in Tønsberg in southeast Norway, signed the agreements with the Abeking and Rasmussen (A&R) shipyard for three multipurpose vessels ordered by the German government's Federal Waterways and Shipping Administration. The design and construction of the three vessels is being supervised by the Federal Waterways Engineering and Research Institute.

To meet the advanced specifications for the LNG system that ensures safe operation in hazardous atmospheres, Høglund will be collaborating with HB Hunte Engineering, headquartered in Oldenburg in the northern German state of Lower Saxony. "This project makes A&R the only shipyard worldwide offering LNG-fuelled vessels that are qualified to operate in hazardous atmospheres," said Høglund. These 90-metre-plus vessels will be equipped with engines generating up to 12,000kW and 145 tonnes of bollard pull, and will have a top speed greater than 15 knots. The three vessels will also be exclusively LNG-powered. Although suitable for worldwide operation, they will be deployed within the German coastline where they will carry out works on sea marks, pollution control and utilising hydroacoustic equipment as well as in pollution control, emergency towing and firefighting.

Høglund explained that given the intended versatility and multiple roles of the vessels and the hazardous atmospheres they will operate in there are obvious additional safety requirements. "Consequently, the yard alongside their federal supervisor and owner are placing extra consideration on the design of the LNG system," said the Norwegian company. To meet these specifications, A&R, Høglund and HB Hunte Engineering have collaborated to develop a dedicated gas safety concept. "With Høglund taking responsibility for the overall FGSS product delivery, HB Hunte will contribute a unique LNG tank design, pipe engineering and integration of the LNG system into the wider vessel architecture," said Høglund. "Combining skills and expertise in this way is key to supporting the greater safety measures required for special vessels of this type," it added. Høglund said that equipping an LNG-fuelled vessel to conduct waterborne firefighting, pollution control and emergency response missions is a particular challenge, as safety must be guaranteed.

The design of the new vessels will meet the requirements of UK maritime classification society, Lloyds Register, and satisfy the strict rules for gas and low flashpoint fuels (IGF Code) aggravated by operation in hazardous atmosphere (gas protection operation). "With increased uptake of LNG as an alternative fuel, it is important that systems such as the FGSS and dedicated automation are in place to support its safe and effective use," said Peter Morsbach, a Vice President at Høglund. "We must take into account complex safety concerns stemming from impacts on the operational profile and atmosphere," he added. "In this case here, the focus lies on the system's safety concept and related design measures in terms of the tank connection spaces, gas treatment rooms, ventilation and monitoring," stated Morsbach.

ICE, the Intercontinental Exchange, reported record activity across its markets for European Dutch Title Transfer Facility (TTF) futures and Japan-Korea Marker futures for North Asia spot cargoes. "Market participants are utilizing the TTF and JKM LNG (Platts) contracts to manage their risk in record quantities," said the Atlanta, Georgia-based ICE. Trading activity records included the highest ever Dutch TTF futures open Interest (OI) tally of approximately 1.9 million contracts on January 27, 2021. Open Interest is the total number of outstanding derivative contracts, such as options or futures that have not been settled for an asset. TTF futures and options also hit record daily volumes of more than 347,500 contracts on January 12.

The Dutch futures, which guide pipeline natural gas and LNG values and activities, posted an average daily volumes increase on ICE of 67 percent year-on-year, with open interest up by 40 percent. ICE owns 12 regulated exchanges and platforms. Its global natural gas complex spans trading hubs from the US and Canada to Europe and Asia, underpinned by an offering of more than 600 financially and physically-delivered contracts. "TTF Futures and Options hit record monthly volume of approximately 4 million contracts in January, beating the previous record set in January 2020," explained the ICE report. "JKM LNG (Platts) hit a combined futures and options OI record of approximately 125,000 contracts on January 14," ICE added. ICE additionally noted that JKM futures hit record a monthly volume of more than 91,500 contracts in January and the average daily volume of the JKM increased 37 percent, with OI up 48 percent year-over-year. "Customers from every corner of the world are turning to our TTF and JKM benchmarks to provide much needed transparent price discovery and enable them to seamlessly transfer risk," said Gordon Bennett, Managing Director, Utility Markets at ICE. "This was particularly needed during the recent turbulence experienced across natural gas markets," added Bennett.

ICE pointed out that an increasing share of total Dutch TTF volume now trades on the exchange versus over-the-counter (OTC). "In 2014, less than 15 percent of TTF volumes were executed via exchanges. At the end of 2020, this figure had increased to approximately 45 percent," stated ICE. "This trend of growing exchange-based market share has continued through the start of 2021, reflecting the enhanced liquidity and transparency of the on-screen market,": the ICE report concluded. The TTF and JKM LNG derivatives are cleared at ICE Clear Europe where they are cleared alongside ICE's global energy futures and options platform covering oil, natural gas, coal, electricity and ICE's leading environmental complex. ICE recently launched a futures contract linked to LNG cargoes on the West Coast of India and Dubai and Kuwait. In a move that the ICE said would further liberalize natural gas markets it was now offering the West India Marker LNG futures contracts (WIM LNG). It said the WIM LNG futures would sit within ICE's global natural gas complex alongside the TTF, the UK National Balancing Point, the US Henry Hub and JKM. The WIM contract is seen by the ICE as providing the link between the global LNG market and the value of gas further downstream in India, as well as the anchor for the trading of spot LNG cargoes in South and West Asia.

INPEX CORP. of Japan, operator of the Ichthys plant in Northern Australia and a shareholder in the offshore Prelude FLNG plant with Royal Dutch Shell, reported losses for 2020 and took hits on Prelude and Eagle Ford assets in the US, while forecasting a recovery in the Japanese and global oil and gas markets for the rest of 2021. Inpex reported a net loss of 111.7 billion yen ($1.06 billion) for 2020 compared with a net profit of 167.3Bln yen ($1.60Bln) in the previous year. Inpex is a shareholder with France's Total in the Ichthys plant near Darwin, supplying Japanese utilities with LNG cargoes as well as Taiwan. The Ichthys plant came on stream in 2018 and produces almost 9 million tonnes per annum of LNG from two processing Trains.

It additionally owns a 17.5 percent interest in the Shell-operated Prelude FLNG facility, moored 475 kilometres offshore of Broome and which was hit by production problems for most of 2020. Inpex said it took an impairment loss in its 2020 earnings on assets related to Prelude FLNG of 129Bln yen ($1.23Bln) for the year to the end of December. The Japanese company also took a hit of 33.23 billion yen ($317M) on its tight oil project in the US Eagle Ford shale basin. "The global economy experienced a slowdown in economic activity in countries around the world impacted by the spread of Covid-19, and business conditions rapidly deteriorated," said the company. "The Japanese economy also experienced a rapid contraction in corporate earnings and consumer spending as well as a deterioration in employment following the declaration of a state of emergency (for Covid) in April 2020," it added. "At present exports, production and consumption are showing signs of recovery thanks to a phased increase in socioeconomic activity," stated Inpex.

While some uncertainty remains, Inpex is expecting a turnaround in its own financial performance during 2021 as the Japanese and global economies recover. Inpex said group's average crude oil sales price for the fiscal year fell to $40.31 per barrel, down $25.01 from the corresponding period of the previous fiscal year. Sales volume of overseas natural gas increased by 50,020 million cubic feet, or 14.7 percent, to 390,053 million cubic feet, and sales volume of domestic natural gas decreased by 71 million cubic metres, or 3.3 percent, to 2,074 million cubic metres(77,413 million cubic feet). In addition, the average sales price of overseas natural gas decreased by $0.72, or 16.6 percent, to $3.61 per thousand cubic feet. The average sales price of domestic natural gas decreased by 7.69 yen, or 14.1 percent, to 46.93 per cubic metres. Inpex said that operating income for the six months to the end of June 2021 is expected to increase 17.9 percent year-on-year to 146.0Bln yen ($1.39Bln) billion, while operating income for the year to December 2021 is forecast to increase 28.4 percent year-on-year to 319.0Bln yen ((3.05Bln). Net sales of oil and gas for the six months ending June 30, 2021 are expected to increase 6.2 percent to 416.0Bln yen ($3.97Bln) and net sales for the year ending in December 2021 are forecast to rise 14.5 percent to 883.0Bln yen ($8.44Bln).

MITSUI O.S.K. Lines, The Japanese shipping company with an operating fleet of almost 100 liquefied natural gas carriers, has held a virtual naming ceremony for the latest newbuild to be chartered to Gas Authority of India (GAIL), the leading LNG importer. The "GAIL Bhuwan", was named by Anu Jain, wide of Manoj Jain, Chairman and Managing Director of GAIL. The vessel with 180,000 cubic metres capacity was constructed at Daewoo Shipbuilding and Marine Engineering in South Korea and will be managed by MOL LNG Transport (Asia) Ltd.

The vessel, which has membrane storage tanks has a width of 47.9 metres, a length of 297.9 metres and a draft of 11.50 metres. The shipping line pointed out that GAIL has contracts for procuring LNG volumes from the US under long-term Sales and Purchase Agreements and a tolling arrangement with the Cove Point plant in Maryland. "The vessel will ship clean LNG fuel from the US to India, for meeting the country's energy requirement and also to other markets globally," said MOL. GAIL current LNG portfolio amounts to 14 million tonnes per annum from various long-term and short-term contracts. MOL has been participating in the Indian market since the beginning of LNG import into the country, with the distinction of having brought the first gas from Qatar. GAIL is the largest natural gas company in India with around 12,426 kilometres existing cross-country pipelines and another 6,747km pipelines in advance stage of completion. GAIL has also expanded its activities into city-gas distribution, exploration and production, solar and wind power generation.

NEXTDECADE Corp., developer of the Rio Grande liquefied natural LNG export project in Texas, has decided not to proceed with another venture called Galveston Bay LNG because part of the project area is under federal law. The Nasdaq-listed company said it had been advised that the site near Texas City was not suitable for development of an LNG facility and related infrastructure and utilities. The US Army Corps of Engineers (USACE), Galveston District, has advised that a portion of the Galveston Bay LNG site is under Federal Navigation

Servitude and serves as an active Dredged Material Placement Area (DMPA) for the Texas City Ship Channel Federal Project. "The Galveston Bay LNG project cannot be constructed without USACE requesting that Congress, via the Water Resources Development Act or other legislation, authorize the release of its constitutional right of Navigation Servitude over this DMPA," explained Houston-based NextDecade.

The federal navigational servitude is an aspect of the sovereignty of the United States, grounded in the right of the Federal Government to regulate commerce, entitling the government to exert a dominance in all lands below the ordinary high water mark of navigable waters. "On account of the potential for prolonged uncertainty around the prospect of release of Federal Navigation Servitude by USACE, NextDecade has elected to forfeit the Galveston Bay LNG site and will no longer make lease payments to the site's landholders, the Texas General Land Office and the City of Texas City," stated NextDecade. The company emphasized that the circumstances of Galveston Bay LNG would have no impact on NextDecade's Rio Grande LNG project in the Port of Brownsville, where late-stage development activities are ongoing. "NextDecade continues to work on remaining commercial agreements needed to achieve a final investment decision on the Rio Grande LNG project in 2021," it said.

Additionally, NextDecade has informed the Federal Energy Regulatory Commission of its intent to withdraw Galveston Bay LNG from FERC pre-filing proceedings and cease all related activities. The company has also requested that the US Department of Energy terminate its June 2018 authorization to export LNG from the Galveston Bay facility. NextDecade said that since 2015, the company's development activities have been acutely focused on delivering Rio Grande LNG and linking to feed gas from the Permian Basin and Eagle Ford Shale to the global LNG market. "While it is unfortunate that the Galveston Bay LNG site is not viable for large-scale infrastructure development, this determination only further enhances the value of, and the need for, NextDecade's world-class Rio Grande LNG project in the Port of Brownsville," said Matt Schatzman, NextDecade's Chairman and Chief Executive. The Rio Grande plant, which is close to two other facilities in the Brownsville Ship Channel area , will produce 27 million tonnes per annum from five liquefaction Trains. Rio Grande LNG is close to the Texas LNG development, owned by New York-based Glenfarne Group, and Annova LNG whose backers include Exelon Corp., the utility headquartered in Chicago.

NOVATEK, the Russian natural gas company and operator of Yamal LNG and developer of the Arctic LNG II project, reported declines in annual revenues and profits because of the adverse effects of Covid-19 for much of 2020 and the impact of a weaker Russian rouble. Novatek said its total gross revenues in 2020, including stakes in joint ventures, dropped by 17.5 percent to 711.8 billion roubles ($9.6 billion), and its gross profits fell 15 percent to 392.0Bln roubles ($5.3Bln). "This was largely due to a decline in global commodity prices for hydrocarbons," said Novatek. "Our revenues also decreased due to a fall in LNG sales volumes on international markets," it added. "The spread of the Covid-19 virus in 2020 and the mandated shutdowns by many governments caused financial and economic stress to the global markets," explained Novatek.

"The ongoing volatility in hydrocarbon commodity benchmark prices significantly influences the dynamics of the Russian rouble relative to foreign currencies," said the company. "As a result, in each quarter of 2020, we recognized substantial foreign exchange effects on foreign currency-denominated loans by the Group's subsidiaries and joint ventures," it added.

Profits attributable to Novatek shareholders came to 169Bln roubles ($2.28Bln), excluding the effects of foreign exchange losses, down from 245.0Bln roubles ($3.3Bln) in 2019. When counting foreign exchange losses, Novatek's annual net income came to 67.8Bln roubles ($907 million), even as its output of natural gas increased. Novatek also noted one-time items in its earnings from 2019 when comparing with 2020 such as the effects from the sale of interests in the Arctic LNG II project and the reorganization of its joint venture AO Arcticgas. "Our total natural gas production including our proportionate share in the production of joint ventures increased by 3.6 percent as compared to 2019," said Novatek.

Natural gas output in 2020 amounted to 77.36 billion cubic metres, up from 74.70 Bcm in 2019. Novatek's own equity sales on international markets as LNG declined to 8.92 Bcm from 12.79 Bcm in 2019. Sales of natural gas in Russia increased to 66.69 Bcm from 65.65Bcm in the previous year. "The decline was mainly due to a decrease in LNG sales volumes purchased from our joint venture OAO Yamal LNG, as a result of an increase in the share of Yamal LNG's direct LNG sales under long-term contracts and the corresponding decrease in LNG spot sales to shareholders, including the Group," Novatek explained.

A significant portion of capital expenditures, amounting to 204.6Bln roubles ($2.76Bln). was spent on the ongoing development of Arctic LNG II. In addition, Novatek said it was spending more on developing fields within the North-Russkiy cluster (the North-Russkoye, the East-Tazovskoye and the Dorogovskoye fields) and the development of the producing fields, Beregovoye, Yurkharovskoye, West-Yurkharovskoye and others.

OMAN LNG, the second main exporter in the Middle East, has named a new Chief Executive to replace Harib Al-Kitani, the long-standing incumbent who has overseen the return of stable feed-gas supplies and the updating of facilities and strategy. A statement from the board at the Arabian Peninsula-based company said Al-Kitani would be stepping down and his successor and new CEO was named as Hamed Al-Numani. Oman exports around 11 million tonnes per annum and its annual dispatch of cargoes covers the main importing nations. "With a long successful journey of four decades in the industry, Al-Kitani's experience has contributed tremendously in shaping Oman LNG as a reliable and trusted supplier," said the board. Al-Kitani is a veteran of the Sultanate of Oman's energy industry and has been at Oman LNG from its inception in the late 1990s, holding a series of high-level positions. "We wish him all the best in his retirement and a big thank you for all he has done to drive our success," the statement added.

His successor Al-Numani comes with 20 years of energy industry experience with projects in Europe and the US. Oman LNG's customers include South Korea with around 3.9MT of annual supplies, Japan with about 3MT as well as other leading importers like China and India. Cargo buyers also include Taiwan, Pakistan and Thailand. The Thai national energy company, PTT Exploration and Production Public Company, has recently agreed to take a 20 percent stake in Oman's upstream natural gas resources from BP of the UK centred on the onshore Block 61 comprising the Khazzan field, which began production in 2017, and the Ghazeer field, onstream since October 2020. Block 61, covering around 3,950 square kilometres in central Oman, contains the largest tight-gas development in the Middle East. Gas from the Block is sent for domestic consumption into Oman's national gas grid, while also boosting the availability of feed-gas for Oman LNG.

Oman has also planned under Al-Kitani to become a major LNG bunkering nation from its port at Sohar in cooperation with French major Total. The main Omani LNG export facilities are at the port of Sur. The plant comprises the three amalgamated liquefaction Trains of two former separate companies, Oman LNG and Qalhat LNG. Al-Kitani also initiated plans for a de-bottlenecking project, whereby better output can be achieved by fixing inefficiencies, both technical and operational, and increasing Oman's LNG output to 11.5 MTPA or more.

PAVILION ENERGY, the subsidiary of Singapore wealth fund Temasek, said its trading unit had signed an agreement with US major Chevron Corp. for the Asian city state to receive LNG shipments for six years with emissions measured along the value chain. Pavilion Trading & Supply Pte Ltd said its accord with Chevron's trading subsidiary was for 500,000 tonnes per annum from 2023. Pavilion stated that under its supply agreement each shipment would be accompanied by a statement of its greenhouse-gas emissions measured from wellhead to discharge port. The volumes will come from the portfolio of Chevron, operator of the Gorgon and Wheatstone plants in Western Australia and the Angola LNG plant in southwest Africa. "As we proactively promote GHG emissions reduction and offsets, we are thrilled to be joined by Chevron," said Frédéric H. Barnaud, Group Chief Executive of Pavilion. "I am confident that a bold, ambitious and uncompromising industry collaboration will boost our own efforts towards achieving a meaningful impact," added Pavilion.

The Singaporean group and its Pavilion Gas unit are at the forefront of efforts to make the Port of Singapore a main Asian LNG hub as well as a leader in providing fuel for LNG-powered ships. Law Tat Win, Chevron's Singapore Country Chairman, said the US company

and the Asian energy player had an accord that pleased all parties. "Chevron embraces a lower-carbon future, where we will continue to deliver affordable, reliable and ever-cleaner products," explained Win. "I am excited that Chevron will be partnering with Pavilion Energy to develop processes and tools which will enable us to offer lifecycle carbon footprinted products to the market in Singapore," he added.

In addition to supplying LNG to Singapore, Pavilion and its strategic partners said they were committed to co-develop and implement a greenhouse-gas quantification and reporting methodology for LNG. They said the methodology was being developed based on internationally recognised standards and would cover emissions from wellhead-to-discharge terminal, including emissions losses in pipelines and LNG transportation. The economic case for using cleaner fuel in the LNG value chain has been made for several years by studies commissioned by energy majors as well as groups such as Sea-LNG, a global coalition of energy and shipping companies backing the increased use of the LNG for shipping. Sea-LNG released independent studies showing that LNG as a marine fuel delivered the best returns on investment. This and other studies have used data from independent simulation and analytics experts measuring emissions along the value chain from well-head to the consumer end-user. The studies concluded that when corporate sustainability and environmental goals were included, such as potential future charges on carbon-dioxide production, choosing LNG as a marine fuel brought additional benefits. Analysts said the Pavilion-Chevron sales and purchase agreement runs parallel to sales in the past couple of years of "green" LNG cargoes whereby the seller pays for "green" offsets such planting trees in a rainforest or contributes to projects aimed at saving rare animals.

PENINSULA Petroleum, a leading marine fuels company, teamed up with Petronas Marine of Malaysia to complete its first LNG bunker supply to H-Line Shipping of South Korea in Malaysian waters. Peninsula said this operation had special relevance as it represented the first LNG bunker delivery to the world's largest LNG-powered bulk carrier, the 180,000 deadweight-ton eco-friendly vessel "HL Green" on its maiden voyage. "The company's global network of offices, suppliers and customers facilitates operational excellence, ensuring smooth supply and quality service," said Peninsula. Additionally, Peninsula's LNG fuel-brokering is being expanded by acquiring its own LNG bunkering vessels and the firm was currently in discussions with several shipowners and shipyards. "The trust placed in the company by a longstanding customer allowed Peninsula to co-ordinate with potential suppliers and expedite the deal from start to finish," added the company.

John A. Bassadone, Peninsula's Chief Executive, thanked the partners for a job well done in providing fuel for the "HL Green". "The Peninsula approach to traditional marine energy works equally efficiently with more sustainable fuels, without any compromise on product quality, or service, so expect to see more activity in this space," added Bassadone. "We are also delighted that the sustainability principles of Peninsula fully align with Petronas Marine, H-Line and their charterer, POSCO," added Bassadone. The CEO stated that it was pleasing to be part of a drive towards positive environmental change, alongside highly respected companies. "Delivery took place safely and was completed within 20 hours, a record time for the quantity supplied (2,760 cbm), including the cooling down of an LNG tank," explained Nacho De Miguel, who leads Peninsula's LNG business. "H-Line, Petronas Marine and Peninsula remained in regular dialogue throughout the process and we look forward to working together again on future LNG bunker deliveries," added De Miguel. Peninsula recently started its LNG bunkering, small-scale LNG business initiative and was working on multiple deals in bunkering locations worldwide.

QATARGAS awarded a contract to Italian energy engineering company Saipem worth $1.7-billion contract for the development of the North Field Production Project offshore of the Northeast coast of the Qatar peninsula to underpin LNG expansion. The scope of work encompasses the engineering, procurement, construction and installation of various offshore facilities for the extraction and transportation of natural gas. The Qatari North Field is the world's biggest single non-associated natural gas field. The field is owned by Qatar Petroleum and is operated by its subsidiary Qatargas. Qatar Petroleum announced the expansion of the gas field in April 2017 after revoking its 12-year self-imposed ban on field development. The expansion will increase Qatar's LNG production capacity from 77 million tonnes per annum to 110MTPA.

First gas from the expansion project is expected to be produced by the end of 2023 of 2024. Saipem will be responsible for platforms, supporting and connecting structures, subsea cables and laying its anti-corrosion internally cladded pipelines. "Furthermore, the project encompasses the decommissioning of a pipeline and other significant modifications to existing offshore facilities," explained Saipem. "Pipe-laying and lifting operations will be executed by one of its vessels in water depths of around 65 metres, leveraging on Saipem's high-end welding technology for corrosion resistant cladded pipelines to stringent quality requirements," added Saipem. This new contract consolidates the Italian group's position in Qatar and is the latest of a string of projects awarded since Saipem's return in the country in 2018 with the Barzan project. Saipem is already executing the WHP12N Jacket project, awarded in July 2020, which is part of the North Field production development.

Additionally, Saipem has received from Qatargas a Letter of Intent for the contractual package regarding offshore export pipelines and related onshore works of the North Field production. The award of the additional package is subject to the definition of contractual details and the client's final approval. "Saipem is well positioned and actively executing various contracts in Qatar, a key market for us with several offshore investments expected to progress in the near future," said Stefano Porcari, Chief Operating Officer of Saipem's Offshore Division. The expansion project will include the development of four new LNG Trains and eight wellhead platforms, from which more than 60 wells are expected to be drilled. Feed-gas volumes of around 4.6 billion standard cubic feet per day will be transported by pipeline to the onshore liquefaction facilities from the southern part of the North Field.

QATAR PETROLEUM has taken the final investment decision and signed project engineering contracts with Japanese company Chiyoda Corp. and European-based Technip Energies for a major liquefied natural gas expansion backed by add-ons such as carbon-capture and solar power. The expansion will comprise the construction of four Trains for liquefaction to take the Arab Gulf state's output from 77 million tonnes per annum up to 110 MTPA. Qatar is additionally considering boosting capacity beyond the 126 MTPA future second expansion already announced. The contract covering onshore engineering, procurement and construction was signed with the Chiyoda-Technip joint venture and is known as the North Field East project.

The main scope of the EPC contract is the construction of the four Trains, each with a capacity of up to 8.25 MTPA with associated facilities for gas treatment, natural gas liquids recovery, as well as helium extraction and refining within the Ras Laffan complex. "Production from that phase will start by the fourth quarter of 2025 and reach full capacity by late 2026 or early 2027," said Saad Sherida Al-Kaabi, Qatar Petroleum Chief Executive as well as Qatar's Minister of State for Energy. "The total cost of the project will be $28.7 billion, making it one of the industry's largest investments in the past few years and the largest LNG capacity ever built," added Al-Kaabi. Al-Kaabi explained that although Qatar Petroleum was ready to develop the additional North Field resources for the overall project on its own, a bidding process for international oil and gas companies to take up to a 30 percent stake in the first phase was being launched. Al-Kaabi said he expected a decision on finalizing any partnerships for the expansion with oil and gas majors to be announced by the end of 2021. Current partners of Qatar in the existing Trains at Ras Laffan include ExxonMobil, ConocoPhillips, Royal Dutch Shell and France's Total.

A second expansion phase, known as the North Field South project, would lift Qatar's LNG production capacity to 126 MTPA by 2027 from the current 77 MTPA. Al-Kaabi said that the Qataris were also evaluating possible further increase in LNG capacity beyond the 126 MTPA. The decision to proceed with the investment was announced during a Webcast signing ceremony to celebrate the execution of the EPC contract. The contract was signed by Al-Kaabi, along with the Chairman and CEO of Chiyoda, Kazushi Okawa, and Arnaud Pieton, the President of Technip Energies. "This project will generate substantial revenues for the state of Qatar and will have significant benefits to all sectors of the Qatari economy during the construction phase and beyond," added Al-Kaabi. The Qatari CEO said the EPC signing had particular importance as it came at a critical time when the world is still

reeling from the effects of a global pandemic and related depressed economies. "This investment decision is a clear demonstration of the steadfast commitment by the State of Qatar to supply the world with the clean energy it needs," he added.

Al-Kaabi noted that the expansion would include its own carbon-dioxide capture and sequestration (CCS) system that would be integrated with a wider CCS project in Ras Laffan, which would be the largest of its kind in terms of capacity in the LNG industry. A significant portion of the expansion project's electrical power needs would be provided from Qatar's national power grid, and Qatar Petroleum is in the process of procuring such power from the 800 megawatt solar power plant currently under construction in Al-Kharsaah. This is in addition to a further 800 MW of solar power which Qatar Petroleum will construct in the near future as part of its plans to have a solar power portfolio of more than 4,000 MW by 2030. The North Field East project would also include a jetty boil-off gas recovery system, which will help reduce GHG by a further 1 MTPA of CO2 equivalent. Al-Kaabi concluded his remarks by thanking the Emir of Qatar for his continued support of the nation's growing LNG industry. "I would like to express our sincere gratitude to His Highness Sheikh Tamim Bin Hamad Al-Thani, the Emir of the State of Qatar, for his guidance and unwavering support to Qatar Petroleum and Qatar's energy sector," stated Al-Kaabi. Japanese company Chiyoda said it was delighted with the signing of the Qatar contract and pointed out that it had been engaged in various hydrocarbon and other industrial plant projects in Qatar since the 1970. "Chiyoda has been involved in all LNG Trains including NFE Trains as FEED contractor and built 12 out of 14 of the existing LNG Trains in Qatar," added the Yokohama-based company. "Chiyoda has provided and completed more than 100 projects for various clients in Qatar, with Chiyoda's local group company, Chiyoda Almana Engineering," it stated.

Diary of events

May
12th World LNG & Gas Asia Pacific Summit
18-20 May ,2021
Kuala Lumpur, Malaysia
https://www.canadagaslng.com

June
7th China LNG & Gas International Exhibition
23 - 25 June, 2021
National Exhibition & Convention Centre (NECC), Shanghai, China
https://www.dmgevents.com/events/

August
Canada Gas & LNG Exhibition and Conference
23 - 25 August, 2021
JW Marriott Parq Vancouver, Canada
https://www.canadagaslng.com/

SEMPRA ENERGY has given more details through its storage unit of plans to construct and operate a "high-deliverability" salt-dome natural gas storage facility in Louisiana for existing and proposed LNG export plants with interconnections to key pipelines. The applicant-prepared environmental assessment for the Hackberry Storage Project submitted to the Federal Energy Regulatory Commission gives full details of the storage facilities in Cameron Parish capable of providing 20.03 billion cubic feet of working gas capacity and 1.5 Bcf per day of LNG feed gas. LA Storage is leading the project and was described as a wholly-owned subsidiary of Liberty Gas Storage, ultimately held by Sempra LNG, operator of the Cameron LNG export plant, and parent Sempra Energy. The storage facility would interconnect with infrastructure operated by Cameron Interstate Pipeline and the certificated Port Arthur Pipeline Louisiana Connector to be operated by Port Arthur Pipeline in Cameron and Calcasieu Parishes in Louisiana. "The interconnection of the Hackberry Storage Project with these pipelines would in turn provide customer access among interstate pipelines serving the Gulf Coast market and natural gas markets along the Southeast and East Coasts," LNG Storage told the regulators.

LA Storage proposes to construct a new natural gas storage facility by converting three existing salt-dome caverns to natural gas storage service and developing one new salt-dome cavern for additional natural gas storage service. "These facilities would be located within the proposed 89.5-acre natural gas storage facility (Gas Storage Facility), which is part of a 160-acre tract of land owned by LA Storage in Cameron Parish," said the filing. "A portion of the Gas Storage Facility site was previously cleared for oil and gas operations," it noted. "As a result, the 89.5-acre parcel currently is mostly open area and contains the three existing caverns and an existing well pad," said LA Storage. Additionally, the project would include the construction of other facilities such as the Pelican Compressor Station, a 21,400-horsepower facility with four natural gas driven reciprocating compressors. "The Hackberry Storage Project would provide high-deliverability storage services that the natural gas markets require to address increasing demand, increased domestic production, increasing LNG exports and heightened gas price volatility," explained the report. "As distinguished from storage provided by caverns constructed from depleted reservoirs, salt-dome cavern facilities are able to inject or withdraw natural gas from storage on short notice and at high rates of deliverability, which can prove useful as a substitute for the supplies of local distribution companies and others with obligations to serve their markets during periods of production and upstream transportation interruption," stated LA Storage. "In addition, the Project's high-performance storage capacity would augment the capabilities of existing Gulf Coast delivery systems by accommodating the widely fluctuating demands of new gas-fired electric generation facilities and smoothing out the fluctuating pattern of gas requirements that can be associated with LNG export terminals," it added.

Under the Natural Gas, the FERC determines whether interstate natural gas storage and transportation facilities are of "public convenience and necessity". The Commission bases its decisions on both economic issues, including need, and environmental impacts. The filing said that the overall construction would affect 441.5 acres, of which 266.7 acres would be required for facility operations. The CIP Lateral would include about 4.9 miles of 42-inch-diameter pipeline beginning at the Gas Storage Facility and extending to the CIP Interconnect Meter Station in Calcasieu Parish. The Hackberry Pipeline would include about 11.1 miles of 42-inch-diameter pipeline, beginning at the Gas Storage Facility and extending to the Port Arthur interconnect meter station in Calcasieu Parish. LA Storage would install the southernmost 4.7 miles of the Hackberry Pipeline within a width of a 230-foot to 330-foot right-of-way. "LA Storage anticipates that the construction of the compressor station and pipelines, and conversion of existing caverns to natural gas storage would begin in March 2022," the company told FERC.

Construction of the compressor station and the gas storage facility is expected to take 21 months and be completed by November 2023. The pipeline and meter station construction is expected to take 14 months and be completed in April 2023. "Drilling for the new cavern (Pelican Well) would begin in October 2023 and is scheduled to be completed in January 2024 for a total construction time of 23 months and an in-service date of June 2025," stated LA Storage.

REGANOSA, the Spanish LNG terminal company, is expanding its portfolio of operated terminals by winning the contract to operate and maintain the regasification facility being brought online on the Italian island of Sardinia. The Spanish company, which operates the Mugardos terminal in northwest Spain, is now a leader in third-party gas plant management. In addition to Mugardos, Reganosa will also shortly take over the operation and maintenance of a floating regasification terminal offshore the port of Tema in Ghana and the first LNG import facility in sub-Saharan Africa. Reganosa already runs a near-shore regas facility for the smallest European Union nation, Malta, in the Mediterranean.

Its latest contract in Sardinia comes from Higas, the development company for the terminal at Oristano and whose joint venture partners include Avenir LNG, comprising London-based Norwegian shipping and storage company Stolt-Nielsen and its peer fleet owners and project companies, Höegh LNG and Golar LNG. The Higas terminal includes a jetty capable of receiving LNG vessels up to 20,000 cubic metres, an unloading arm, six horizontal cryogenic holding tanks of 1,500 cubic metres capacity each, two LNG truck-loading bays and a natural gas power generation system. The Sardinian terminal can load in excess of 8,000 LNG trucks each year for subsequent distribution to smaller satellite stations across the island in a classic version of a targeted small-scale LNG project. Sardinia currently lacks a system of access to natural gas and only a small number of industrial customers receive LNG by truck which is brought to the island by ferry.

Avenir LNG is building up a fleet of small-scale LNG carriers to supply the Sardinian facility and other small terminals worldwide. Reganosa began operating the Mugardos facility in 2006 and is certified as a Transmission System Operator at European level. The Spanish company's name, Regasificadora del Noroeste (Reganosa), stands for northwest

regasification and it additionally operates a local natural gas pipeline network. Reganosa's international expansion began in 2015 with the creation of Reganosa Services to provide the knowledge and experience of the group in studies, project designs, consulting, engineering and asset management. "The group has covered all the phases of development of regasification projects, from viability studies to commercial operation," explained Reganosa. Over the last four years, Reganosa has provided various regasification studies and gas services in nations such as Brazil, Canada, Chile, Colombia, Germany, Spain, France, Mozambique, India, Japan, Kuwait and Pakistan.

SHARJAH, the third-largest emirate in the United Arab Emirates, has met with Claudio Descalzi, Chief Executive of the leading oil and gas exploration and production and LNG project company Eni, to take stock of progress after Eni's acquisition of the exploration rights on three onshore blocks. Sharjah's ruler, Dr. Sultan bin Muhammad Al Qasimi who is a member of the Supreme Council of the UAE, and Descalzi discussed gas as well as other future opportunities relating to the energy transition. Eni and Sharjah National Oil Corp. (SNOC), the state company of the emirate, recently started production from the Mahani gas and condensate field, located in Sharjah's onshore Concession Area B. This was achieved in less than two years from the signing of the oil contract and in less than a year from the declaration of the discovery.

Eni, a shareholder in projects such as the Damietta LNG plant in Egypt set to soon come back on stream and in two Mozambique LNG projects, is also carrying out exploration activities in areas A and C of the emirate, of which Area C is largely under-explored. "The milestones we have achieved so far with an incredible time-to-market is the result of the support of Dr. Sultan III bin Muhammad al-Qasimi and the harmonious partnership between SNOC and Eni," said Descalzi. "These are great achievements, particularly considering the exceptional challenges incurred during the year due to the Covid-19 pandemic," added the Eni CEO. The UAE is aiming to increase its natural gas resources by investing more in exploration and production in the next few years. In the Sharjah gas field, Eni holds a 50 percent stake in the Concession Area B along with partner SNOC with the Sharjah firm acting as operator. Eni acquired Area B in a competitive bid round in January 2019.

Production from the Mahani field is sent through a new multiphase trunk line to SNOC's Sajaa Gas Plant where it is processed utilizing the existing facilities and infrastructure. Eni said that field production is expected to increase progressively with the connection of further wells planned to be drilled during 2021-2022. In addition to Sharjah, Eni is also present in two other emirates, Abu Dhabi and Ras Al Khaimah, the fourth-largest of the seven emirates that make up the UAE. Abu Dhabi is the capital of the UAE and the second-most populous city after Dubai. Abu Dhabi holds the most oil and gas resources of all the emirates and currently produces around 5.8 million tonnes per annum of LNG at the Das Island liquefaction plant off Abu Dhabi. The UAE also imports diminishing quantities of LNG as its domestic gas position improves.

SONATRACH, the Algerian state energy company and one of the main suppliers of LNG and pipeline natural gas to Europe, has commissioned the Boosting III project for the Hassi R'mel gas hub in Laghouat province of central Algeria, which produces and supplies over half of the nation's natural gas. The Hassi R'Mel's Boosting III project came into operation as Sonatrach also announced increased natural gas sales in 2020 to both Spain and Italy, its main European markets. The giant Hassi R'Mel field had been in long-term decline but the $2-billion project just completed in a contract led by JGC Corp. of Japan and including local companies, Cosider, GTP and Enac will boost volumes during 2021 and beyond. The project will increase and stabilize feed-gas supplies to the Mediterranean Coast from the Hassi R'Mel hub to the port of Arzew where one of the nation's two LNG exports plants are located. Algerian LNG exports had been falling in previous years, though in the most recent official annual figures had recovered to a combined 12.34 million tonnes from the Arzew plant and the second facility at Skikda.

Developing new fields in Algeria and linking them to the rest of the gas network via the Hassi R'Mel hub has been a strategic priority for Sonatrach over the past few years. The Hassi R'Mel's Boosting III project entailed the installation of three compressor stations: South, Center and North. "Despite the Covid-19 pandemic, the contractual deadlines for completion and start-up of the operating phase were met with the required quality, thanks to the commitment of the project team," said Sonatrach. The Booster III project will enable the maintenance of an estimated production level of 180 million cubic metres per day and to recover additional reserves estimated at 400 billion cubic metres of natural gas. "In addition, this achievement allows Sonatrach to strengthen its current production capacities to continue to meet the growing needs of the national gas market and also to honour its contractual export obligations, particularly during periods of strong demand for natural gas," explained the company.

Sonatrach also stated that in 2020, Algeria exported to Italy a volume of gas of 14.8 Bcm, an increase of 12 percent compared with 2019. The Algerian supplier also consolidated its position as Spain's leading gas supplier in 2020 with an exported volume of 9.6 Bcm, part of which flowed through to Portugal. The volumes also comprised LNG cargoes delivered to the southern European nations as well as on the three pipelines, two to Spain and one to Italy. Algerian gas supplies are carried from the Hassi R'Mel hub on the Medgaz pipeline via Beni Saf to Almeria in southern Spain and on the Maghreb-Europe Gas Pipeline from the Hassi R'mel field through Morocco to Cordoba in Spain. The Italian gas also starts from the Hassi R'mel hub and is supplied through the Trans-Mediterranean Pipeline from Algeria via Tunisia to Sicily and then onwards to the mainland of Italy.

TC ENERGY, the Canada-based North American pipeline company, said it was working with the Royal Dutch Shell-led LNG Canada project on establishing a revised project schedule for the Coastal GasLink as delays are inevitable along with higher costs due to scope expansion, permit delays and the impacts from Covid-19. The updates on the Coastal GasLink and the Keystone XL project cancelled by the US were part of the latest earnings report from the Calgary, Alberta-based company. TC Energy's earnings improved and it reported annual net profits had increased by around 12.3 percent to C$4.5Bln (US$3.5Bln) from C$3.9Bln (US$3.1Bln) in 2019. TC Energy explained that the British Columbia Provincial Health Officer issued an order restricting the number of workers on site for industrial projects, including the Coastal GasLink.

That pipeline will be 670 kilometres (416 miles) in length and provide feed-gas for the liquefaction and export plant currently under constructed at Kitimat in the Pacific Coast province of British Columbia. Once completed, the pipeline will connect abundant Western Canadian Sedimentary Basin natural gas supply to the Shell-operated facility. "Coastal GasLink is working with the provincial health authorities to safely resume construction activities in accordance with the objectives and timelines defined in the order," stated TC Energy. "We expect that project costs will increase significantly and the schedule will be delayed compared to the previously disclosed estimate due to scope increases, permit delays and the impacts from Covid-19, including the provincial health order," explained TC Energy. "Although Coastal GasLink will continue to mitigate these impacts to the extent possible, incremental costs will be included in the final pipeline tolls, subject to certain conditions. We do not anticipate our future equity contributions will increase significantly following the conclusion of this process," it added.

At the same time, TC Energy said it was still assessing the impact of its Keystone XL project being cancelled under the January US Presidential order. "As a result, we suspended the advancement of the Keystone XL pipeline project and ceased capitalizing costs, including interest during construction, and also ceased accruing a return on the Government of Alberta interests as of that date, while we assess our options along with our partner, the Government of Alberta, and other stakeholders," explained TC Energy. "We expect to record a substantive, predominantly non-cash, after-tax charge to our earnings in first quarter 2021, which will be excluded from comparable earnings," added the company. This 1,947km (1,210-mile) Keystone pipeline was designed to deliver 830,000 barrels per day of crude oil from Hardisty in the Canadian province of Alberta to the US state of Nebraska. It would then have connected with existing US facilities to reach US Gulf Coast refiners to meet critical needs for transportation fuel and manufactured products. Keystone had been expected to be placed into service in 2023.

The Coastal GasLink and Keystone disappointments were offset by increased contributions to earnings from the Mexico

Natural Gas Pipelines division, mainly due to higher earnings from TC Energy's investment in the South Texas pipeline from the US to Mexico following its September 2019 start-up. Also in Mexico, TC Energy reported progress in the Guadalajara project linked to an LNG terminal. "A project to allow bi-directional flows was completed in December 2020 and the TSA with the Mexican Federal Electricity Commission was renegotiated," explained TC Energy. "The bi-directional flow allows access to either LNG imports from the Manzanillo LNG terminal or access to continental natural gas at the Guadalajara supply points for delivery to regional markets," added the company.

TEEKAY LNG Partners, whose gas group units own, charter or have stakes in 77 vessels, including 47 liquefied natural gas carriers and 30 liquefied petroleum gas or multi-gas vessels, reported annual net income almost halved, though its long-term charters strategy partially protected the company from the worst of the challenges. Teekay LP said its net profits for 2020 came to 87.35 million compared with 152.79M in 2019. For the fourth quarter net income was also down by around the same margin to $35.14M versus $67.37M in the prior year quarter. Voyage revenues increased in the fourth quarter to $154.07M, an increase on the $148.79M recorded in the same three months of 2019.

Annual voyage revenues were slightly lower at $591.10M compared with $601.25M for the previous year. "For both the fourth quarter and fiscal year 2020, we generated strong earnings and cash flows resulting in the highest ever recorded annual adjusted results for Teekay LNG," stated Mark Kremin, President and Chief Executive of Teekay Gas Group Ltd. "During a year which saw extreme volatility in gas prices, LNG shipping rates and equity markets, our strategy of chartering substantially all of our LNG fleet on long-term contracts helped us to achieve consistently strong results," explained Kremin. "Throughout the year we maintained certainty and forward visibility amid the unprecedented uncertainty and volatility that impacted many others in the broader energy space in 2020," said the CEO.

In its LNG chartering activities chartering activities, the charterer of the 52 percent-owned LNG carrier "Marib Spirit" decided in October 2020 to exercise its options to extend the current charter by 14 months at a higher charter rate, extending the vessel's charter coverage to early-2022. The Partnership's 52 percent-owned joint venture with Marubeni Corp. (the MALT joint venture) secured a two-year, fixed-rate charter contract in December 2020, with a one-year option, for the "Methane Spirit" which is expected to commence after its current charter contract ends in March 2021. Teekay LP noted that quarterly income from vessel operations for the LNG segment for the three months to the end of December 31decreased primarily due to a $14.3M gain on the derecognition of the "WilForce" and "WilPride" LNG carriers as they were reclassified as sales-type leases prior to their sale in January 2020.

The Hamilton, Bermuda-based company's fleet comprises 47 LNG carriers and 30 liquefied petroleum gas and multi-gas vessel. In December 2020, the Teekay LP's 50 percent-owned LPG joint venture with Belgium's Exmar NV successfully refinanced its $254M revolving credit facility and term loan by entering into a new revolving credit facility for $310M maturing in December 2023.

TOTAL reported overall liquefied natural gas sales in 2020 of 38.3 million tonnes, an increase of 12 percent over the previous year, boosted by projects such as the US Cameron LNG export plant in Louisiana and revealed plans to change its name to Total Energies. "LNG sales increased thanks to the start-up of three Trains at Cameron LNG in the US, the ramp-up of Yamal LNG in Russia and Ichthys LNG in Australia and the increase in trading activities," said Total. Adjusted net income plunged 59 percent in the fourth quarter to $1.30 billion versus the same three months of 2019. Annual adjusted net income dropped 66 percent to $4.06Bln in 2020 compared with the previous year.

Total's cash flow during 2020 also took a hit and fell by 37 percent year-on-year to $17.60Bln. Fourth-quarter LNG sales volumes to the end of December 2020 dropped 6 percent to 10.0MT from 10.6MT in the same three months of 2019. Total's natural gas and LNG activities are within the Integrated Gas, Renewables & Power (IGRP) division. In LNG trading, Total said its average Japan-Korea Marker price for LNG cargoes in 2020 was down 20 percent to $4.40 per MMBtu compared with $5.50 per MMBtu in 2019. However, the spot price increased to $8.00 per MMBtu in the fourth quarter versus $3.60 per MMBtu in the third quarter. "The average LNG sales price rebounded by 37 percent in the quarter compared to the previous quarter, due to the seasonality of demand and the delayed impact of higher oil prices in the third quarter 2020 on long-term LNG contracts," the company explained. Total's realised European natural gas prices declined 31 percent during 2020 to the equivalent of $3.30 per MMBtu.

Hydrocarbon production for LNG in the fourth quarter decreased by 15 percent compared to a year ago, notably due to the shutdown of the Equinor-operated Snohvit LNG plant in Norway following a fire at the end of September 2020. The company listed several fourth-quarter LNG highlights in its earnings statement, including finalizing its 16.6 percent stake in the Costa Azul LNG project on the Pacific Coast of Mexico, a joint venture led by Cameron LNG plant owner, Sempra Energy. Total additionally delivered its first "carbon neutral" LNG cargo to the Chinese major, China National Offshore Oil Corp., and completed the first LNG bunkering for a new containership owned by French shipping line CMA CGM. The LNG fuel operation took place in the Dutch port of Rotterdam. The Group continued to implement its strategy to integrate along the electricity and gas chain in Europe and has increased the number of its electricity and gas customers by 1.5 million and 1 million, respectively, notably thanks to the finalization of the acquisition in the fourth quarter of a portfolio of customers from Energías de Portugal in Spain. "The Group's fourth-quarter results rebounded from the previous quarter in a context where oil prices stabilized above $40 per barrel, thanks to strong OPEC+ discipline, and where gas prices rose sharply in Europe and Asia, but where refining margins remained depressed, still affected by low demand and high inventories," said Chairman and Chief Executive Patrick Pouyanné.

Looking ahead, the CEO said the Group's profile will be transformed over the 2020-2030 decade and the growth of energy production will be based on two pillars, LNG and Renewables & Electricity, while oil products are expecting to fall from 55 percent to 30 percent of sales. "To anchor this transformation, the Group will propose to its shareholders at the Annual General Meeting on May 28, 2021, changing its name to Total Energies," explained CEO Pouyanné. "They will hence have the opportunity to endorse this strategy and the underlying ambition to transition to carbon neutrality," he stated. In 2020, Total secured its investments in Renewables and Electricity ($2Bln) and accelerated the implementation of its strategy to grow renewables, adding 10 gigawatts to its portfolio.

VENTURE GLOBAL raised $500 million of funding in transactions arranged by American and Japanese banks to finance construction activities at the Plaquemines LNG export project in Louisiana ahead of a final investment decision. The Arlington, Virginia-based company already has an export plant under construction at Calcasieu Pass in Cameron Parish and has received authorization to build the Plaquemines export facility at river mile-marker 55 on the west side of the Mississippi, about 30 miles south of New Orleans. The company said it had closed the term-loan involving JPMorgan Chase Bank, Morgan Stanley Senior Funding, Bank of America and Japan's third-largest banking group, Mizuho Bank. "The transaction was upsized from $400M to $500M based on strong lender interest," said Venture Global. "The proceeds will be used to fund pre-FID construction activities at the company's Plaquemines LNG export project as well as for general corporate purposes," it added.

The transaction was upsized from $400 million to $500 million based on strong lender interest. Plaquemines will be constructed in two phases, each phase designed with liquefaction and export capacity of 10 MTPA, and possibly more under optimal operating conditions. Venture Global in December 2020 stated that US engineering firm KBR could have the engineering, procurement and construction contract for the first phase of the Plaquemines project. The most advanced development by Venture Global is the Calcasieu Pass export plant in Louisiana, which is expected to come on stream in 2022 along with its associated TransCameron Pipeline. The company is also studying other LNG export opportunities in the state of Louisiana. Venture Global Chief Executive Michael Sabel said he was pleased to be able to continue to partner with a group of leading banks, all of whom are lenders to the Calcasieu Pass export project. "Replicating the successful strategy we pioneered and utilizing the same configuration, we will continue to execute on our commitment to provide the lowest cost LNG to the global market and supply the world's growing demand for clean and reliable energy," added Sabel. ■

GTT adds to portfolio

GTT (Gaztransport & Technigaz) has continued its diversification plan by adding three companies to its portfolio last year., reports Technical Editor Ian Cochran.

However, GTT's core business as a technology and engineering company specialising in membrane containment systems for the transport and storage of liquefied gas, continued to strengthen in 2020 and this year thus far.

Almost exactly a year ago, GTT finalised the purchase of Icelandic smart shipping company Marorka, which specialises in operational reporting and energy performance improvement systems aimed at reducing vessels' environmental footprint of vessels.

Marorka is a good fit with Ascenz, a Singaporean company acquired in 2018, GTT claimed.

The second acquisition concerned OSE Engineering which was bought into the fold in July, 2020. This French company specialises in artificial intelligence (AI) for transport applications.

This acquisition complements the GTT Group's expertise in modelling complex systems and optimising engineering processes.

Finally, changing direction, GTT bought Areva H2Gen, since renamed Elogen, in October, 2020.

This company, is a French leader in proton exchange membrane (PEM) electrolysis, specialising in the design and assembly of electrolysers to produce green hydrogen. It is the only company to manufacture electrolysis units in France.

In the annual results presentation, GTT said that the targeted acquisitions were made to enrich the company's technological portfolio and digital offering, adding that its ambition was to become a reference player in a profitable and fragmented smart shipping market.

By having Ascenz, Marorka and OSE in its portfolio, GTT now has a comprehensive offering available for shipowners, charterers and operators.

As for Elogen, GTT's ambition is to become what it calls a 'Tier 1' player in green hydrogen by 2030.

By then there will be a substantial European green hydrogen market as the European Community's (EC) strategic three step plan includes the promotion of €470 bill total investments leading to 12-14% of the total energy mix in Europe by 2050.

Furthermore, GTT said that Europe could become the world's first green hydrogen producer by 2025, driven mainly by political and regulatory incentives.

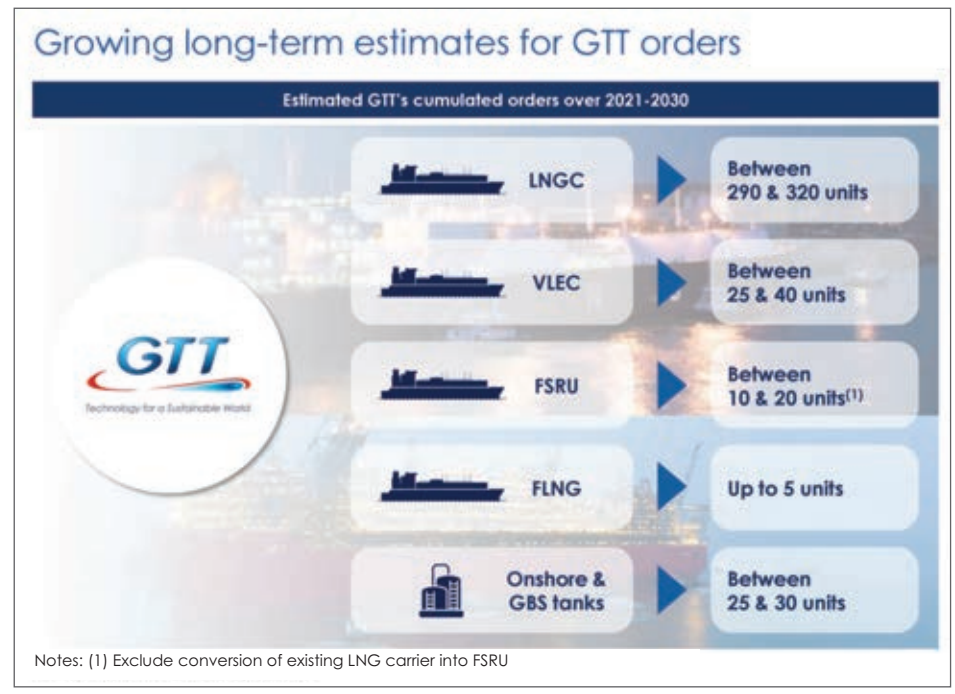
GTT also said that one part of an ongoing plan was to recruit engineers to strengthen innovation, research & development and IT sectors within the group to support its business model and set a course for the future.

Today, the company has around 550 employees of which about 80% are engineers and technicians. To help the company grow, it has set aside a training budget of about €500,000 per annum with an R&D budget of around €30 mill per annum.

Membrane systems

Of course, the company was originally set up to design membrane type tank containment systems, which are sold under license to mainly South Korean and Chinese shipyards building gas carriers.

Since then, GTT has also focused on containment systems for land-based gas storage tanks and for gravity based structures (GBS) located offshore. In addition, the company is now involved in designing LNG fuel tanks for vessels powered by gas.



Despite being viewed as an interim answer to the low emissions regulations, GTT expressed enthusiasm for the future of containment systems to 2030.

The company estimated that it would win between 290 and 320 new orders for containment systems to be fitted on LNGCs, 25-40 for very large ethane carriers (VLECs), 10-20 FSRUs, excluding conversions and up to five FLNGs to 2030.

As at the end of December last year, GTT's system orderbook stood at 122 LNGCs, nine VLECs, four FSRUs, two FSUs and one FLNG. Onshore storage tank fittings amounted to six, while the company had won an order for three GBS from Saren for the Arctic LNG 2 project.

Looking at the LNG as a fuel market, GTT estimated that in the period 2021-2026, there would be around 1,500-2,000 ships ordered specifying LNG as a fuel per annum of which around 15% would be large vessels.

AiPs

This year, the success continued with an approval in principle (AiP) from classification societies Bureau Veritas and DNV GL for the application of its NO96 containment system on the tanks of large capacity container ships.

With these approvals, GTT technology for these type of tanks is entering a new phase, the company explained.

Later on 15th February, 2021, GTT was awarded two more AiPs from BV.

The first was related to the 'NH3 Ready' classification of Mark III membrane tanks, while the second related to the higher design pressure of '1 barg' in LNG as fuel applications, such as large container vessels.

In its 2020 roundup, GTT reported that in addition to the 12 LNGCs booked during the first half of the year, a further 29 orders were won during the second half. The 41 gas carriers will be delivered between 2022 and 2025.

Included in the total were two medium-capacity LNGCs ordered by "K" Line for the Chinese market, and 15 Arc7s, following the signing in late June, 2020 of a Technical Assistance and Licensing Agreement (TALA) with the Russian shipyard Zvezda Shipbuilding Complex (Zvezda).

GTT's membrane technology was also selected for four 98,000 cu m VLECs to be built by Korean shipbuilders' Hyundai Heavy Industries (HHI) and Samsung Heavy Industries (SHI). This followed on from an order for six ethane carriers a year earlier.

Designed for multi-gas use, ie to transport ethane as well as several types of gas, such as propylene, LPG and ethylene, these vessels will also be 'LNG-ready', offering the possibility of containing LNG in the future without the need to convert their tanks.

Also last year, GTT won four new service provision contracts with - CMA CGM, Excelerate Energy, Knutsaen and Fleet Management, Hong Kong.

The Group offers shipowners framework agreements that include a wide range of services relating to the operation and maintenance of ships equipped with GTT systems. ■

The inside of a GTT designed LNGC tank. Photo credit - BV

WinGD introduces new X72DF engine types

Large marine engine and technology developer, WinGD has added four new versions to its successful X72DF dual-fuel engine portfolio.

These new prime movers were developed to provide ship design flexibility and to help owners reduce their engines installed power and emissions, the company told *LNG Journal* Technical Editor Ian Cochran.

The X72DF is currently the best-selling engine in WinGD's catalogue. For example, it was stipulated for every low-speed 2-stroke engine ordered for a newbuilding LNGC last year.

"Our most successful engine model is now available in four configurations," explained WinGD Global Sales Director, Volkmar Galke. "These options reflect the varied demands on shipowners to design vessels more efficiently, reduce installed power and cut emissions dramatically.

"Whatever route shipowners choose to meet these demands, there is now an X72DF that will work for them," he added.

Alongside the engine's basic design improvements, options are now available to optimise lower power output in five and six-cylinder configurations.

They were also designed to house the company's improved methane slip reducing X-DF2.0 technology, while the basic version, X72DF-1.1, incorporates the company's new engine control system, WinGD Integrated Control Electronics (WiCE).

Several other design improvements, focused on enhancing reliability, while simplifying production and installation, were also made along with the addition of a modular scavenging concept to improve control over combustion and emissions.

For five and six-cylinder engines, further optimisation is available to improve efficiency at lower power outputs. For example, the X72DF-1.2 features a selected power/speed range with a lower specific fuel consumption.

This configuration was designed specifically for ships, such as LNGCs and will be attractive to owners and shipyards seeking to limit installed power in line with the IMO's energy efficient design indices (EEDI/EEXI) for newbuildings and existing vessels, the company claimed.

Compact design

Optimising a reduced power rating and limited cylinder configuration enables a more compact design, with a shorter thrust section, an optimised gear drive and a smaller fuel supply unit contributing to reduced engine length. This equates to greater flexibility in the engine room and versatility potential for the ship design, the company added.

The new versions are available as X-DF2.0 upgrades featuring iCER (intelligent control by exhaust recycling) technology. Unveiled in June last year, iCER can reduce methane emissions by up to 50%, compared with X-DF1.0 engines. Both the X72DF-2.1 and 2.2 series have also been specifically tailored for LNG fuelled vessels.

All four versions are now available. The first delivery is scheduled for April, 2022, with the handing over of the first iCER-equipped engine targeted for the third quarter of next year.

WinGD is looking forward to 2021 with its sound operational experience of almost 1 mill operating hours on its low pressure dual-fuel X-DF engine series

2-strokes to prevail

Commenting on the future of internal combustion engines given the alternative fuel choices now circulating, Galke told *LNG Journal:* "Of course, the low speed 2-stroke engine will prevail. It is the best choice for deepsea shipping when it comes to digesting the future fuels to come.

"For example, ammonia has a very slow reaction characteristic,

WinGD's Volkmar Galke.

which fits well with the slow speed engine and its combustion behaviour. In addition, the X-DF concept, combining the OTTO and the DIESEL cycle, offers a flexible platform to choose the right combustion cycle for each individual X-fuel to to be injected either in gaseous or liquid form."

As for the medium term market, WinGD expected a slight increase in LNGC contracting this year, giving deliveries in two to three years time when LNG market demand was still thought to be bullish.

Of particular focus is the huge Qatari NFE production capacity growth, which has recently taken a financial investment decision (FID). To serve this project, Qatar Petroleum has already secured many slots at the major LNGC shipbuilding yards.

"Hence, WinGD is looking forward to 2021 with its sound operational experience of almost 1 mill operating hours on its low pressure dual-fuel X-DF engine series," Galke said.

Turning to the possibility of a shorter LNGC lifespan going forward as suggested by GTT, Galke said; "Technology is moving fast these days making older vessels like steam turbine LNGCs less attractive not only from an efficiency point of view but also in terms of the new high class containment systems available today.

"However, at the moment we at WinGD as engine designers do not see a strong influence on the propulsion system when it comes to a possible reduction of an LNGC's lifecycle.

"We can of course assume that a lifetime reduction of five to 10 years would then lead to another generation of ships leading up to the IMO's 2050 GHG limit," he concluded. ■

X72DF engine principal particulars

	X72DF-1.1	X72DF-1.2	X72DF-2.1	X72DF-2.2
No. of cylinders	5-8	5-6	5-7	5-6
Cylinder bore (mm)	720	720	720	720
Piston stroke (mm)	3,086	3,086	3,086	3,086
Speed (rpm)	69-89	69-79	69-89	69-79
MCR (kW)	25,800	15,600	22,575	15,600

Crowley anticipates LNG fuelling growth

An increase in reliability and scale of LNG fuelling infrastructure is set to drive a greater diversity of users in landside facilities and maritime bunkering applications, according to energy and maritime solutions provider Crowley. LNG Fuelling editor Malcolm Ramsay has more.

As more supply points emerge and more supporting infrastructure is built, the firm predicts that LNG usage will increase not just for large, utility users but also for smaller-scale users such as industrial companies, remote communities, and LNG powered vessels. The increase in development of supply options is also forecast to increase supply chain reliability and economies of scale.

"As the development of more LNG supply points emerge this facilitates the growth of LNG distribution and bunkering services in more and more markets. This growth in supply availability increases the supply chain reliability and economies of scale to provide LNG to more types of LNG users whether large or small," Matt Jackson, Vice President, Crowley Shipping, told *LNG Journal*.

Crowley foresees LNG providing an alternative in many geographic markets as greenhouse gas (GHG) thresholds are lowered and international maritime requirements also shepherd in lower carbon impacts by shipping operators.

"LNG is readily available, abundant, and cost effective to achieve immediate results and can also be a stepping stone as a bridge fuel to other net-zero emission fuels or technologies that develop in the future." Jackson adds.

LNG bunkering slows: distribution demand rises

The company predicts that LNG fuelling roll-out will continue despite a slower rate of deployment in the vessel bunkering market than previously anticipated, due to the COVID-19 pandemic. However, overall LNG demand has increased for industrial distributed LNG as many industries and countries are investing in reliable and resilient microgrids combining multiple technologies such as solar, battery and LNG, Jackson notes.

"The COVID-19 pandemic has affected the vessel bunkering sector by slowing down the pace of growth in the LNG bunkering market. LNG-powered-vessel shipyard construction was initially stopped, and now future LNG-powered vessels are delayed under new shipyard safety protocols that limit production," Jackson explains, adding that major LNG users such as the cruise ship sector have not been allowed to sail. "However other sectors such as industrial microgrids are investing now to achieve reliable and resilient solutions to their power needs and reduce emissions."

Looking to the future, Crowley sees the advancement of LNG technology for vessels as a key step in meeting future demand as it seeks to improve efficiency of bunkering systems and enhance safety procedures to ensure that LNG can be reliably used as a vessel fuel.

"The Crowley Engineering Services team responsible for vessel design and construction is constantly evaluating new advances in technology we can leverage whether it's for cryogenic systems, hull design, propulsion, or safety. Besides prior design concepts previously created, we have some unique designs for LNG bunkering vessels we plan to share in the future," Jackson concludes.

Crowley vessel bunkering LNG

Crowley LNG refuelling trucks

Future demand

Headquartered in Florida, Crowley is a family and employee-owned and has developed LNG distribution services since 2013, following its acquisition of Carib Energy. Today it is one of the largest developers of LNG fuelling infrastructure in the state and delivers a range of marine solutions, energy, and logistics services.

In 2018, Crowley introduced the *El Coquí*, the first of two combination container/roll-on, roll-off ship to be powered by LNG and since then has expanded its LNG supply chain services , which include sourcing and distribution services as well as weekly operations serving the U.S. mainland-to-Puerto Rico liner cargo trade. The vessels operation has driven down impacts from carbon dioxide and other matter, winning recognition from the U.S. Environmental Protection Agency.

Crowley's LNG services are now part of its New Energy Division, launched in January this year, which includes focused resources on the LNG fuelling segment. The group sees scope for further expansion and disruption in the transport sector supported by the company's LNG fuelling services, such as microgrid solutions, engineering and vessel fuel bunkering.

"The new division builds on the success of the company's 53-year history of support in the oil and gas industry with U.S.-flag vessel assets, engineering, and logistics services, many of which quickly and easily pivot for the new sector. Included in the LNG services is providing LNG bunkering vessels to meet the future demand. Crowley provides expertise in all aspects of LNG provisioning, including essential engineering and design services to administrative and regulatory guidance," Jackson added.

The new division will also develop offshore wind services and aims to explore a range of emerging energy projects, some of which may offer the potential to combine the firm's total lifecycle services expertise in LNG with new wind power projects, such as microgrid opportunities that offer resiliency via combined wind and LNG energy sources. The division will continue to provide service in the U.S. and adjacent regions in the first instance.

"The New Energy division is the next evolution in our prioritization of this market with a singular focus on developing and delivering access and support to more sustainable energy sources to our customers. We can draw upon our broad portfolio of engineering and naval architecture, multi-faceted supply chain solutions, and 129 years of maritime transportation to deliver tailored, reliable results," Matt Yacavone, senior vice president at Crowley Shipping, said. ■

World LNG Carrier Fleet

LNG Carrier	Capacity m^3	Registered Owner	Builder	Delivery	Flag	Power Plant	Cargo System	No. of Tanks	Original Project
Aamira	268,000	Nakilat SHI 1753 Inc.	Samsung	Apr-10	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Abadi	135,000	BGC One Nbd Sdn Bhd.	Mitsubishi	May-02	Brunei	Steam	Moss	5	Lumut
Adam LNG	162,000	Adam Maritime Transportation	HHI	Jul-14	Marshall Is.	Diesel	Membrane	4	Oman LNG
Adriano Knutsen	180,000	Hai Feng 1717 Ltd.	HHI	Jul-19	Spain	ME-GI	TZ Mk. III Flex Plus	4	Corpus Christi
Al Aamriya	210,168	J5 Nakilat No. 1 Ltd.	Daewoo	May-08	Marshall Is.	Diesel	GT NO 96	5	RasGas III
Al Areesh	148,786	Al Areesh LLC	Daewoo	Jan-07	Bahamas	Steam	GT NO 96	4	RasGas II
Al Bahiya	210,100	Nakilat DSME 2286 Inc.	Daewoo	Dec-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas IV
Al Biddah	137,339	Mitsui/Nippon/Kawasaki/Iino	Kawasaki	Nov-99	Japan	Steam	Moss	5	Qatargas I
Al Daayen	148,853	Al Daayen LLC	Daewoo	Mar-07	Bahamas	Steam	GT NO 96	4	RasGas II
Al Dafna	268,000	Nakilat SHI 1726 Inc.	Samsung	Oct-09	Marshall Is.	Diesel	GT NO 96	10	RasGas
Al Deebel	145,000	Peninsula LNG Transport No. 3	Samsung	Nov-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Al Gattara	216,200	Overseas LNG H1 Corp.	HHI	Nov-07	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Al Ghariya	210,150	Julia Neptora	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Al Gharrafa	216,200	Overseas LNG H2 Corp.	HHI	Jan-08	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas II
Al Ghashamiya	217,591	Nakilat SHI 1696 Inc.	Samsung	Apr-09	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas III
Al Ghuwairiya	263,300	Nakilat Al Ghuwairiya Inc.	Daewoo	Dec-08	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
Al Hamla	216,200	Overseas LNG S2 Corp.	Samsung	Feb-08	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Al Hamra	137,000	Al Hamra Ltd.	STX	Nov-96	Liberia	Steam	Moss	4	Das Island
Al Huwaila	217,000	Al Huwaila Inc.	Samsung	May-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Jasra	137,227	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Jun-00	Japan	Steam	Moss	5	Qatargas I
Al Jassasiya	145,700	Venice Maritime	Daewoo	May-07	Greece	Steam	GT NO 96	4	RasGas II
Al Karaana	210,100	Nakilat DSME 2284 Inc.	Daewoo	Oct-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas III
Al Kharaitiyat	216,300	Nakilat HHI 1909 Inc.	HHI	Jun-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Al Kharsaah	217,000	Al Kharsaah Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Khattiya	210,150	Nakilat DSME 2283 Inc.	Daewoo	Jul-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas IV
Al Khaznah	135,496	Al Khaznah Inc.	Mitsui E&S	Jul-94	Liberia	Steam	Moss	5	Das Island
Al Khor	137,354	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Nov-96	Japan	Steam	Moss	5	Qatargas I
Al Khuwair	217,000	Al Khuwair Inc.	Samsung	Jun-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Mafyar	266,000	Nakilat SHI 1697 Inc.	Samsung	Apr-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas III
Al Marrouna	149,539	Al Marrouna LLC	Daewoo	Sep-06	Bahamas	Steam	GT NO 96	4	RasGas II
Al Mayeda	266,000	Nakilat SHI 1694 Inc.	Samsung	Jan-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas III
Al Nuaman	210,100	Nakilat DSME 2285 Inc.	Daewoo	Dec-09	Marshall Is.	Diesel	GT NO 96	4	Qatargas III
Al Oraiq	210,200	J5 Nakilat No. 3 Ltd.	Daewoo	Jun-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Al Rayyan	137,420	Mitsui/Nippon/Kawasaki/Iino	Kawasaki	Mar-97	Japan	Steam	Moss	5	Qatargas I
Al Rekayyat	216,293	Nakilat HHI 1910 Inc.	HHI	Jun-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Al Ruwais	210,150	Alexandra Neptana	Daewoo	Aug-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Al Sadd	210,200	Nakilat DSME 2265 Inc.	Daewoo	Mar-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Al Safliya	210,150	Britta Nausola	Daewoo	Sep-07	Bahamas	Diesel	GT NO 96	5	Qatargas II
Al Sahla	216,200	J5 Nakilat No. 5 Ltd.	HHI	Jun-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Samriya	263,300	Nakilat Al Samriya Inc.	Daewoo	Feb-09	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
Al Shamal	217,000	Al Shamal Inc.	Samsung	Apr-08	Bahamas	Diesel	TZ Mk. III	10	RasGas III
Al Sheehaniya	210,100	Nakilat DSME 2264 Inc.	Daewoo	Feb-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Al Thakhira	145,000	Peninsula LNG Transport No. 2	Samsung	Aug-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Al Thumama	216,200	J5 Nakliat No. 2 Ltd.	HHI	Feb-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Utouriya	215,000	J5 Nakilat No. 8 Ltd.	HHI	Sep-08	Marshall Is.	Diesel	TZ Mk. III	4	RasGas III
Al Wajbah	137,308	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Jun-97	Japan	Steam	Moss	5	Qatargas I
Al Wakrah	137,371	Mitsui/Nippon/Kawasaki/Iino	Kawasaki	Nov-98	Japan	Steam	Moss	5	Qatargas I
Al Zubarah	137,573	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Nov-96	Japan	Steam	Moss	5	Qatargas I
Alto Acrux	147,798	Bahamas LNG Transport Ltd.	Mitsubishi	Mar-08	Bahamas	Steam	Moss	4	Darwin LNG
Amadi	154,800	BGC Four Nbd Sdn Bhd.	HHI	Jul-15	Brunei	DFDE	Membrane	4	Lumut
Amali	148,000	BGC Spv Nbd Sdn Bhd.	Daewoo	Aug-11	Brunei	DFDE	GT NO 96	4	Lumut
Amani	154,800	BGC Three Nbd Sdn Bhd.	HHI	Oct-14	Brunei	DFDE	Membrane	4	Lumut
Amberjack LNG	174,000	Xiang Ch17 HK International	HHI	Apr-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Amur River	149,700	Seacrown Maritime Ltd.	HHI	Nov-07	Marshall Is.	Steam	TZ Mk. III	4	Sakhalin II
Arctic Aurora	155,000	Fareastern Shipping Ltd.	HHI	Jul-14	Malta	Diesel/Gas-Electric	TZ Mk. III	4	Snøhvit LNG
Arctic Discoverer	142,612	Northern LNG Trans Co. I Ltd.	Mitsui E&S	Feb-06	Bahamas	Steam	Moss	4	Hammerfest
Arctic Lady	147,200	Barents Leasing Ltd.	Mitsubishi	Apr-06	Norway	Steam	Moss	4	Hammerfest
Arctic Princess	147,200	Rb-Quadrangle Leasing Ltd.	Mitsubishi	Jan-06	Norway	Steam	Moss	4	Hammerfest
Arctic Spirit	89,800	Arctic Spirit LLC	Ishikawajima	Dec-93	Bahamas	Steam	IHI SPB	4	Atlantic LNG
Arctic Voyager	142,759	Northern LNG Trans Co. II Ltd.	Kawasaki	Jul-06	Bahamas	Steam	Moss	4	Hammerfest
Aristidis I	174,000	Capital Trading	HHI	Jan-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Aristos I	174,000	Xiang Ch25 HK International	HHI	Nov-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Arkat	148,000	BGC Spv Nbd Sdn Bhd.	Daewoo	Feb-11	Brunei	DFDE	GT NO 96	4	Lumut
Arwa Spirit	165,500	Membrane Shipping Ltd.	Samsung	Aug-08	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf

Aseem	155,003	India LNG Transport Co. No. 3	Samsung	Nov-09	Malta	Diesel	TZ Mk. III	4	RasGas
Asia Endeavour	160,000	Chevron Transport Corp. Ltd.	Samsung	Jun-15	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon
Asia Energy	154,800	Chevron Transport Corp. Ltd.	Samsung	Oct-14	Bahamas	DFDE	TZ MK. III	4	Gorgon
Asia Excellence	160,000	Chevron Transport Corp. Ltd.	Samsung	Feb-15	Bahamas	DFDE	TZ MK. III	4	Gorgon
Asia Integrity	160,000	Chevron Transport Corp. Ltd.	Samsung	Feb-17	Bahamas	DFDE	TZ Mk. III	4	Wheatstone
Asia Venture	160,000	Chevron Transport Corp. Ltd.	Samsung	Jul-17	Bahamas	Diesel/Gas-Electric	TZ Mk. III Flex	4	Wheatstone
Asia Vision	154,800	Chevron Transport Corp. Ltd.	Samsung	Jul-14	Bahamas	Diesel/Gas-Electric	TZ MK. III	4	Gorgon
Barcelona Knutsen	173,400	Norspan LNG V AS	Daewoo	Jan-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Beidou Star	172,000	Capricorn LNG Shipping Ltd.	Hudong Zhonghua	Sep-15	Hong Kong	Diesel	TZ MK. III	4	PNG LNG
Berge Arzew	138,088	Berge Arzew/Sonatrach Berge	Daewoo	Jul-04	Bahamas	Steam	GT NO 96	4	Arzew
Bilbao Knutsen	138,000	Norspan LNG AS	Izar	Jan-04	Spain	Steam	GT NO 96	4	Portfolio
Bishu Maru	164,700	Trans Pacific Shipping 3 SA	Kawasaki	Dec-17	Panama	TFDE	Moss	4	Wheatstone
Bonito LNG	174,000	Xiang Ch18 HK International	HHI	May-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Boris Davydov	172,410	Hai Kuo Shipping 1605 Ltd.	Daewoo	Dec-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Boris Vilkitsky	172,410	Hai Kuo Shipping 1601 Ltd.	Daewoo	Jun-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
British Achiever	173,644	Ngoti No. 20 Spc B SA	Daewoo	Nov-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Contributor	173,644	Hai Kuo Shipping 1533 Ltd.	Daewoo	Dec-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Listener	173,644	Hai Kuo Shipping 1535 Ltd.	Daewoo	Jan-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Mentor	173,644	Ngoti No. 20 Spc C SA	Daewoo	Mar-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Partner	173,400	Ngoti No. 20 Spc A SA	Daewoo	Jun-18	Isle of Man	ME-GI	GT NO 96	4	Freeport
British Sapphire	155,000	Sg Leasing Gems Ltd.	HHI	Jun-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
British Sponsor	173,644	Ngoti No. 20 Spc D SA	Daewoo	May-19	Isle of Man	ME-GI	GT NO 96	4	Freeport
Broog	137,529	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Apr-98	Japan	Steam	Moss	5	Qatargas I
Bu Samra	266,000	Nakilat Bu Samra Inc.	Samsung	Dec-08	Marshall Is.	DRL	TZ Mk. III	5	Qatargas II
Bushu Maru	180,000	Trans Pacific Shipping 6 Ltd.	Mitsubishi	Jul-19	Bahamas	Reheat Steam Turbine	TZ MK. III Flex	4	Sabine Pass
BW Boston	138,059	BW Gas Global LNG DA	Daewoo	Jan-03	Norway	Steam	GT NO 96	4	Atlantic LNG
BW Brussels	162,400	BW LNG IV Pte Ltd.	Daewoo	Aug-09	Singapore	Diesel/Gas-Electric	GT NO 96	4	Balhaf
BW Everett	138,028	Everett LNG Pte Ltd.	Daewoo	Jun-03	Singapore	Steam	GT NO 96	4	Atlantic LNG
BW Lilac	173,400	Helianthus Navigation Corp.	Daewoo	Mar-18	Malta	ME-GI	GT NO 96	4	Data unavailable
BW Magna	173,000	BW FSRU III Pte Ltd.	Daewoo	Mar-19	Sinapore	DFDE	TZ MK. III Flex	4	Data unavailable
BW Magnolia	173,400	Helen Navigation Pte Ltd.	Daewoo	Feb-20	Singapore	ME-GI	GT NO 96	4	Portfolio
BW Paris	162,400	BW FSRU IV Pte Ltd.	Daewoo	Jul-09	Sinapore	Diesel/Gas-Electric	GT NO 96	4	Balhaf
BW Pavilion Aranda	173,400	BW Diamond LNG Pte Ltd.	Daewoo	Sep-19	Singapore	ME-GI	TZ MK. III Flex	4	Portfolio
BW Pavilion Aranthera	173,400	BW Diamond LNG Pte Ltd.	Daewoo	Jul-20	Singapore	ME-GI	GT NO 96	4	Portfolio
BW Pavilion Leeara	158,629	BW Pavilion Leeara Pte Ltd.	HHI	Jun-15	Singapore	Diesel/Gas-Electric	Membrane	4	Portfolio
BW Pavilion Vanda	155,000	BW Pavilion Vanda Pte Ltd.	HHI	Feb-15	Singapore	DFDE	Membrane	4	Portfolio
BW Tatiana	135,269	FSRU Development Pte Ltd.	Mitsubishi	Dec-02	Marshall Is.	Steam	Moss	5	Atlantic LNG
BW Tulip	173,400	BW LNG I Pte Ltd.	Daewoo	Dec-17	Singapore	ME-GI	GT NO 96	4	Data unavailable
Cadiz Knutsen	138,826	Norspan LNG II As	Navantia	Apr-04	Spain	Steam	GT NO 96	4	Portfolio
Cape Ann	145,130	SRV Joint Gas Two Ltd.	Samsung	Apr-10	Norway	Diesel/Gas-Electric	TZ Mk. III	4	Jaigarh LNG
Castillo De Caldelas	176,300	La Arena Nav SA	Imabari Shipbuilding	Jun-18	Malta	ME-GI	TZ Mk. III Flex	4	Portfolio
Castillo de Merida	176,300	San Isidro LNG I BV	Imabari Shipbuilding	Mar-18	Malta	ME-GI	TZ MK. III Flex	4	Portfolio
Castillo de Santisteban	170,000	Trans Gas Naviera Aie	STX	Jun-10	Malta	Diesel Electric	GT NO 96	4	Portfolio
Castillo de Villalba	138,000	Trans Gas Naviera Aie	Navantia Cadiz	Sep-03	Spain	Steam	GT NO 96	4	Portfolio
Catalunya Spirit	138,000	Teekay Gas III SL	Izar	Jun-03	Spain	Steam	GT NO 96	4	Atlantic LNG
Celsius Canberra	180,000	Celsius Shipping	Samsung	Jan-21	Marshall Is.	X-DF	Membrane	4	Portfolio
Celsius Copenhagen	180,000	Greenheart Gas Shipco I LLC	Samsung	Nov-20	Marshall Is.	X-DF	TZ Mk. III Flex Plus	4	Portfolio
CESI Beihai	174,000	China Energy Aspiration LNG	Hudong Zhonghua	Jun-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Gladstone	174,000	China Energy Aspiration LNG	Hudong Zhonghua	Oct-16	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI LianYungAng	174,000	China Energy Glory LNG	Hudong Zhonghua	Jun-18	Hong Kong	TFDE	GT NO 97	4	APLNG
CESI Qingdao	174,000	China Energy Hope LNG	Hudong Zhonghua	Feb-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Tianjin	174,000	China Energy Pioneer LNG	Hudong Zhonghua	Jul-17	Hong Kong	TFDE	GT NO 96	4	APLNG
CESI Wenzhou	174,000	China Energy Peace LNG	Hudong Zhonghua	Feb-18	Hong Kong	Diesel-Electric	GT NO 96	4	APLNG
Cheikh Bouamama	75,558	Skikda LNG Trans Corp.	Universal SB	Jul-08	Bahamas	Steam	TZ Mk. III	4	Arzew/Skikda
Cheikh El Mokrani	75,759	Mediterranean LNG Transport	Japan Marine United	Jun-07	Bahamas	Steam	TZ Mk. III	4	Skikda
Christophe de Margerie	170,000	Zelitiko Shipping Co. Ltd.	Daewoo	Nov-16	Cyprus	Diesel/Gas-Electric	GT NO 96 GW	4	Yamal
Clean Energy	149,700	Pegasus Shipholding SA	HHI	Mar-07	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
Clean Horizon	162,000	Sea 43 Leasing Co Ltd.	HHI	Apr-15	Malta	Diesel/Gas-Electric	Membrane	4	Portfolio
Clean Ocean	162,000	Cdbl Ocean Ltd.	HHI	May-14	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Sabine Pass
Clean Planet	162,000	Cdbl Planet Ltd.	HHI	Aug-14	Marshall Is.	Diesel Electric	Membrane	4	Yamal
Clean Vision	162,000	Sea 44 Leasing Co. Ltd.	HHI	Aug-15	Malta	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
CNTIC VPower Global	28,260	CNTIC VPower LNG Logistics	COSCO (Dalian) Shipyard Co.	Apr-20	Hong Kong	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Cool Discoverer	174,000	Serendipity Maritime Ltd.	HHI	Sep-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Cool Explorer	160,000	Safe Port Marine Ltd.	Samsung	Jan-15	Malta	DFDE	TZ Mk. III	4	Spot
Cool Racer	174,000	Eloquent Shipping	Samsung	Feb-21	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Cool Runner	160,000	Priority Maritime Corp.	Samsung	Mar-14	Malta	Diesel Electric	TZ Mk. III	4	Wheatstone
Cool Voyager	160,000	Energy Shipping & Trading SA	Samsung	Oct-13	Malta	TFDE	TZ Mk. III	4	Wheatstone
Coral Encanto	30,000	Maxluck Plus Ltd.	Ningbo Xinle	Jul-20	Marshall Is.	DFDE	Cylinders	2	Portfolio

Corcovado LNG	160,162	Oceanus LNG Alpha LLC	Daewoo	Apr-14	Malta	Diesel Electric	GT NO 96	4	Spot
Creole Spirit	173,400	Hai Jiao 1601 Ltd.	Daewoo	Feb-16	Bahamas	ME-GI	GT NO 96	4	Sabine Pass
Cubal	160,276	Mint LNG IV Ltd.	Samsung	Jan-12	Bahamas	DFDE	TZ Mk. III	4	Soyo
Cygnus Passage	145,400	Cygnus LNG Shipping Ltd.	Mitsubishi	Jan-09	Bahamas	Steam	Moss	4	Sakhalin II
Dapeng Moon	147,200	Yue Gang LNG Shipping Co. Ltd.	Hudong Zhonghua	Jul-08	Hong Kong	Steam	TZ MK. III	4	Pluto
Dapeng Star	147,210	Yue Yang LNG Shipping Co. Ltd.	Hudong Zhonghua	Nov-09	Hong Kong	Steam	TZ MK. III	4	Pluto
Dapeng Sun	147,200	Yue Peng LNG Shipping Co. Ltd.	Hudong Zhonghua	Apr-08	Hong Kong	Steam	GT NO 96	4	North West Shelf
Diamond Gas Metropolis	174,000	Diamond LNG Shipping 4 Ltd.	HHI	Nov-20	Bahamas	X-DF	TZ Mk. III Flex	4	Portfolio
Diamond Gas Orchid	165,000	Diamond LNG Shipping 1 Pte Ltd.	Mitsubishi	Jun-18	Bahamas	STaGE	Sayaringo	4	Cameron
Diamond Gas Rose	165,000	Diamond LNG Shipping 2 Pte Ltd.	Mitsubishi	Aug-18	Bahamas	STaGE	Sayaringo	4	Cameron
Diamond Gas Sakura	165,000	Diamond LNG Shipping 3 Pte Ltd.	Japan Marine United	May-19	Bahamas	STaGE	Sayaringo	4	Cameron
Disha	136,025	India LNG Transport Co. No. 1	Daewoo	Dec-03	Malta	Gas Turbine	GT NO 96	4	RasGas
Doha	137,262	Mitsui/Nippon/Kawasaki/Iino	Mitsubishi	Jun-99	Japan	Steam	Moss	5	Qatargas I
Dorado LNG	174,000	Cardiff LNG Epsilon Owning LLC	Samsung	Dec-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Duhail	210,150	Gabriela Nauranto	Daewoo	Dec-07	Bahamas	Diesel	GT NO 96	4	Qatargas II
Dukhan	137,661	LNG Water Lily Shipping Corp.	Mitsui E&S	Sep-04	Liberia	Steam	Moss	5	Qatargas II
East Energy	122,255	Sinokor Maritime Co. Ltd.	STX	Aug-82	South Korea	Steam	Membrane	4	NLNG
Eduard Toll	172,410	TC LNG Explorer I LLC	Daewoo	Sep-17	Bahamas	TFDE - Azipod	GT NO 96 GW	4	Yamal
Ejnan	145,000	Peninsula LNG Transport No. 4	Samsung	Jan-07	Bahamas	Steam	TZ Mk. III	4	RasGas II
Ekaputra	136,400	Hikmah Sarana Bahari Pt.	Mitsubishi	Jan-89	Indonesia	Steam	Moss	5	Bontang
Elisa Larus	174,000	Caroline 77 Sasu	Hyundai Samho	May-20	France	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Energy Advance	147,624	Tokyo LNG Tanker/Toho LNG	Kawasaki	Mar-05	Japan	Steam	Moss	4	Portfolio
Energy Atlantic	156,000	Spectacle Shipping & Trading	STX	Sep-15	Malta	TFDE	Moss	4	Sabine Pass
Energy Confidence	153,000	Tokyo LNG Tanker/Nippon Yusen	Kawasaki	Apr-09	Japan	Steam	Moss	4	Darwin LNG
Energy Endeavour	173,400	Rossini Navigation SA	Daewoo	Jan-21	Marshall Is.	ME-GI	TZ Mk. III Flex	4	0
Energy Frontier	147,599	Tokyo LNG Tanker Co. Ltd.	Kawasaki	Sep-03	Japan	Steam	Moss	4	Sakhalin II
Energy Glory	165,000	Tokyo LNG Tanker/Nippon Yusen	Japan Marine United	Mar-19	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Horizon	177,000	Tokyo LNG Tanker/Nippon Yusen	Kawasaki	Aug-11	Japan	Steam	Moss	4	Pluto
Energy Innovator	165,000	Tokyo LNG Tanker/Mitsui OSK	Japan Marine United	Jun-19	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Liberty	165,000	Tokyo LNG Tanker/Mitsui OSK	Japan Marine United	Oct-18	Japan	TFDE	TZ Mk. III Flex Plus	4	Cove Point
Energy Navigator	145,000	Tokyo LNG Tanker/Mitsui OSK	Kawasaki	May-08	Japan	Steam	Moss	4	Sakhalin II
Energy Pacific	173,400	Ravel Navigation SA	Daewoo	Aug-20	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Energy Progress	147,558	Jovial Shipping Navigation SA	Kawasaki	Nov-06	Bahamas	Steam	Moss	4	Darwin LNG
Energy Universe	166,571	Lusby Shipping SA	Japan Marine United	Aug-19	Panama	TFDE	TZ Mk. III Flex	4	Cove Point
Enshu Maru	164,700	Trans Pacific Shipping 4 SA	Kawasaki	Aug-18	Panama	Reheat Steam Turbine	Moss	4	Wheatstone
Esshu Maru	153,000	Trans Pacific Shipping 2 Ltd.	Mitsubishi	Dec-14	Bahamas	Steam	Sayaendo	4	Portfolio
Etyfa Prometheas	135,269	Enlink Trading FZE	Mitsubishi	Oct-02	Cyprus	Steam	Moss	5	Portfolio
Excalibur	138,034	Solaia Shipping LLC	Daewoo	May-02	Belgium	Steam	GT NO 96	4	Portfolio
Fedor Litke	172,410	Hai Kuo Shipping 1602 Ltd.	Daewoo	May-17	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Flex Amber	174,000	Bund 10 Holding Ltd.	HHI	Oct-20	Marshall Is.	X-DF	TZ Mk. III Flex	4	Portfolio
Flex Artemis	174,000	Flex LNG Reliance Ltd.	Daewoo	Aug-20	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Flex Aurora	174,000	Flex LNG Aurora Ltd.	HHI	Jun-20	Marshall Is.	X-DF	TZ Mk. III Flex	4	Portfolio
Flex Constellation	173,400	Flex LNG Constellation Ltd.	Daewoo	Jun-19	Marshall Is.	ME-GI	NO-96-GW+PRS	4	Data unavailable
Flex Courageous	173,400	Flex LNG Courageous Ltd.	Daewoo	Aug-19	Marshall Is.	ME-GI	NO-96-GW+PRS	4	Data unavailable
Flex Endeavour	172,400	Triple H No. 3 Ltd.	Daewoo	Jan-18	Malta	ME-GI	NO-96-GW+PRS	4	Portfolio
Flex Enterprise	172,400	Triple H No. 4 Ltd.	Daewoo	Jan-18	Malta	ME-GI	NO-96-GW+PRS	4	Data unavailable
Flex Freedom	173,400	Flex Freedom Ltd.	HHI	Jan-21	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Flex Rainbow	174,000	Xiang Ch13 HK International	Samsung	Jun-18	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Spot
Flex Ranger	174,101	Flex LNG Ranger Ltd.	Samsung	Jun-18	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Flex Resolute	173,400	Flex LNG Resolute Ltd.	HHI	Sep-20	Marshall Is.	ME-GI	NO-96-GW+FRS	4	Portfolio
Fraiha	210,100	J5 Nakilat No. 6 Ltd.	Daewoo	Aug-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Fuji LNG	149,172	Aletheia Owning Co Ltd.	Kawasaki	Mar-04	Malta	Steam	Moss	4	Sabine Pass
Fuwairit	138,200	Camartina Shipping Co.	Samsung	Jan-04	Bahamas	Steam	TZ Mk. III	4	RasGas II
Galicia Spirit	140,624	Teekay Gas II SL	Daewoo	Jul-04	Spain	Steam	GT NO 96	4	Portfolio
Gaslog Chelsea	153,000	Gas-Fifteen Ltd.	Hanjin (Busan)	Jun-10	Bermuda	Diesel/Gas-Electric	Sayaendo	4	Portfolio
Gaslog Galveston	170,520	GasLog LNG Services	Samsung	Jan-21	Bermuda	X-DF	Membrane	4	Portfolio
Gaslog Geneva	174,000	Gas-Thirteen Ltd.	Samsung	Oct-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Genoa	174,000	Gas-Twenty Two Ltd.	Samsung	Mar-18	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
GasLog Georgetown	174,000	Ceres Shipping Ltd.	Samsung	Nov-20	Bermuda	X-DF	Membrane	4	Portfolio
Gaslog Gibraltar	174,000	Gas-Fourteen Ltd.	Samsung	Nov-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Gladstone	174,000	Gas-Twenty Three Ltd.	Samsung	Mar-19	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Glasgow	174,000	Gas-Twelve Ltd.	Samsung	Jul-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Greece	174,000	Gas-Eleven Ltd.	Samsung	Mar-16	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Hong Kong	174,000	Gas-Twenty Five Ltd.	HHI	Mar-18	Bermuda	X-DF	TZ Mk. III Flex	4	Portfolio
Gaslog Houston	174,000	Gas-Twenty Four Ltd.	HHI	Dec-18	Bermuda	X-DF	TZ Mk. III Flex	4	GoM
Gaslog Salem	155,000	Gas-Ten Ltd.	Samsung	May-15	Bermuda	Diesel/Gas-Electric	Membrane	4	Portfolio
Gaslog Santiago	155,000	Gas-Four Ltd.	Samsung	Mar-13	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Gaslog Saratoga	155,000	Gas-Nine Ltd.	Samsung	Dec-14	Bermuda	Diesel/Gas-Electric	Membrane	4	Spot
Gaslog Savannah	155,000	Gas-One Ltd.	Samsung	May-10	Bermuda	Diesel	TZ Mk. III	4	Portfolio

Gaslog Seattle	155,000	Gas-Seven Ltd.	Samsung	Oct-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Shanghai	155,000	Gas-Three Ltd.	Samsung	Feb-13	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Gaslog Singapore	155,000	Gas-Two Ltd.	Samsung	Aug-10	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
GasLog Skagen	155,000	Gas-Six Ltd.	Samsung	Aug-13	Bermuda	TFDE	TZ Mk. III	4	Portfolio
Gaslog Sydney	155,000	Gas-Five Ltd.	Samsung	Jun-13	Bermuda	DFDE	TZ Mk. III	4	Portfolio
Gaslog Wales	180,000	Gas-Thirty One Ltd.	Samsung	May-20	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Warsaw	180,000	GasLog Hellas-1 ENE	Samsung	Jul-19	Greece	X-DF	TZ Mk. III Flex Plus	4	Spot
Gaslog Westminster	180,000	Gas-Thirty Ltd.	Samsung	Jul-20	Bermuda	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Gaslog Windsor	180,000	Gas-Twenty Eight Ltd.	Samsung	Apr-20	Bermuda	X-DF	TZ MK. V	4	Portfolio
Gemmata	135,269	National Australia Finance	Mitsubishi	Feb-04	Singapore	Steam	Moss	5	Peru LNG
Georgiy Brusilov	172,410	Hai Kuo Shipping 1801 Pte Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Georgiy Ushakov	172,652	DY Tankers Ltd.	Daewoo	Sep-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Ghasha	137,000	Ghasha Inc.	Mitsui E&S	Jun-95	Liberia	Steam	Moss	5	Das Island
Gigira Laitebo	177,419	Cleopatra LNG Shipping Co. Ltd.	HHI	Feb-10	Bahamas	DFDE	TZ Mk. III	4	RasGas
Global Energy	74,100	Global Energy Armateur SNC	STX	Jan-04	France	Diesel/Gas-Electric	CS1	4	Portfolio
Global Energy	74,100	Global Energy International	STX	Jan-04	Marshall Is.	Diesel/Gas-Electric	CS1	4	Portfolio
Global Star	173,400	Global Star Inc.	Daewoo	Jan-21	Marshall Is.	ME-GI	TZ Mk. III Flex	4	Portfolio
Golar Arctic	140,648	Golar LNG 2216 Corp.	Daewoo	Oct-03	Marshall Is.	Steam	GT NO 96	4	Jamaica LNG
Golar Bear	160,000	Cool Bear Shipping Ltd.	Samsung	Sep-14	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Celsius	160,000	Noble Celsius Shipping Ltd.	Samsung	Oct-13	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Crystal	159,800	Oriental Fleet LNG 01 Ltd.	Samsung	Sep-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Frost	160,000	Golar LNG NB12 Corp.	Samsung	Oct-14	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Portfolio
Golar Glacier	162,000	Hai Jiao 1401 Ltd.	Hyundai Samho	Nov-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Grand	145,700	Golar Grand Corp.	Daewoo	Jan-06	Marshall Is.	Steam	GT NO 96	4	Gorgon
Golar Ice	160,000	Hai Jiao 1406 Ltd.	Samsung	Jan-15	Marshall Is.	Diesel Electric	Membrane	4	Spot
Golar Kelvin	162,000	Hai Jiao 1405 Ltd.	Hyundai Samho	Jan-15	Marshall Is.	DFDE	Membrane	4	Spot
Golar Maria	145,700	Golar LNG 2234 LLC	Daewoo	Jun-06	Marshall Is.	Steam	GT NO 96	4	Spot
Golar Mazo	135,255	Faraway Maritime Shipping	Mitsubishi	Dec-99	Liberia	Steam	Moss	5	Bontang
Golar Penguin	160,000	Oriental Fleet LNG 02 Ltd.	Samsung	Sep-14	Marshall Is.	TFDE	Membrane	4	Spot
Golar Seal	160,000	Compass Shipping 1 Corp. Ltd.	Samsung	Sep-13	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Spot
Golar Snow	160,000	Hai Jiao 1402 Ltd.	Samsung	Jan-15	Marshall Is.	Diesel/Gas-Electric	Membrane	4	Spot
Grace Acacia	149,700	Algawin Shipping Inc.	HHI	Feb-07	Bahamas	Steam	TZ Mk. III	4	Spot
Grace Barleria	149,700	NYK Line	HHI	Apr-07	Japan	Steam	TZ Mk. III	4	Portfolio
Grace Cosmos	150,000	Algahunt Shipping Inc.	HHI	Feb-08	Bahamas	Steam	TZ Mk. III	4	Portfolio
Grace Dahlia	177,000	NYK Line	Kawasaki	Sep-13	Japan	Steam	Moss	4	Spot
Grand Aniva	145,000	NYK-SCF LNG Shpg No. 2 Ltd.	Mitsubishi	Jan-08	Cyprus	Steam	Moss	4	Sakhalin II
Grand Elena	145,580	NYK-SCF LNG Shpg No. 1 Ltd.	Mitsubishi	Oct-07	Cyprus	Steam	Moss	4	Sakhalin II
Grand Mereya	147,000	Ice Gas LNG Shipping Co. Ltd.	Mitsui E&S	Mar-08	Cyprus	Steam	Moss	4	Sakhalin II
Hanjin Muscat	138,366	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Jul-99	South Korea	Steam	GT NO 96	4	Oman LNG
Hanjin Pyeongtaek	130,636	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Sep-95	South Korea	Steam	GT NO 96	4	Bontang
Hanjin Ras Laffan	138,214	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Jul-00	South Korea	Steam	GT NO 96	4	RasGas I
Hanjin Sur	138,333	H-Line Shipping Co. Ltd.	Hanjin (Busan)	Feb-00	South Korea	Steam	GT NO 96	4	Oman LNG
Hispania Spirit	145,500	Teekay Gas Naviera SL	Daewoo	Aug-02	Spain	Steam	GT NO 96	4	Peru LNG
Hoegh Giant	165,000	Hoegh LNG Giant Ltd.	HHI	Jan-17	Marshall Is.	Diesel/Gas-Electric	TZ MK. III Flex	4	Portfolio
Hongkong Energy	138,000	Ocean Trinity Sh No. 27 SA	Daewoo	Feb-04	Marshall Is.	Steam	GT NO 96	4	North West Shelf
Hyundai Aquapia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	May-00	South Korea	Steam	Moss	4	Oman LNG
Hyundai Cosmopia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	Feb-00	South Korea	Steam	Moss	4	RasGas I
Hyundai Ecopia	149,745	KLT 1 International SA	HHI	Nov-08	Panama	Steam	TZ Mk. III	4	Balhaf
Hyundai Greenpia	125,000	Hyundai LNG Shipping Co. Ltd.	HHI	May-96	South Korea	Steam	Moss	4	MLNG
Hyundai Oceanpia	135,000	Hyundai LNG Shipping Co. Ltd.	HHI	Jun-00	South Korea	Steam	Moss	4	Oman LNG
Hyundai Peacepia	174,000	HIb SA	Daewoo	Jun-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Hyundai Princepia	174,000	HIa SA	Daewoo	May-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Hyundai Technopia	137,415	Hyundai LNG Shipping Co. Ltd.	HHI	Jul-99	South Korea	Steam	Moss	4	RasGas I
Hyundai Utopia	125,182	Hyundai LNG Shipping Co. Ltd.	HHI	Jun-94	South Korea	Steam	Moss	4	Donggi Senoro
Iberica Knutsen	138,000	Norspan LNG III AS	Daewoo	Aug-06	Norway	Ultra Steam Turbine	GT NO 96	4	Portfolio
Ibra LNG	147,000	Areej LNG Carrier SA	Samsung	Jul-06	Panama	Steam	TZ Mk. III	4	Oman LNG
Ibri LNG	147,569	Dune LNG Carrier SA	Mitsubishi	Jul-06	Panama	Steam	Moss	4	Oman LNG
Ish	137,000	Ish Inc.	Mitsubishi	Nov-95	Liberia	Steam	Moss	5	Das Island
K. Acacia	138,017	Korea Line LNG Co. Ltd.	Daewoo	Dec-99	South Korea	Steam	GT NO 96	4	Oman LNG
K. Freesia	138,015	Korea Line LNG Co. Ltd.	Daewoo	Aug-00	South Korea	Steam	GT NO 96	4	RasGas I
K. Jasmine	145,878	Kolt JV No. 1 SA	Daewoo	May-08	Panama	Steam	TZ MK. III	4	Sakhalin II
K. Mugungwha	151,812	Kolt JV No. 2 SA	Daewoo	Nov-08	Panama	Steam	TZ MK. III	4	Oman LNG
Kinisis	173,400	Danae Gas Shipping Inc.	Daewoo	Oct-18	Liberia	ME-GI	TZ Mk. III Flex	4	Portfolio
Kita LNG	147,895	Oceanus LNG Beta LLC	Daewoo	May-14	Malta	Diesel Electric	GT NO 96	4	Spot
Kmarin Diamond	155,000	Sg Leasing Gems Ltd.	Hyundai Samho	Jul-08	Isle of Man	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Kmarin Emerald	155,000	Sg Leasing Gems Ltd.	HHI	May-07	Isle of Man	DFDE	TZ Mk. III	4	Portfolio
Kumul	170,000	Gemini LNG Shipping Ltd.	Hudong Zhonghua	Dec-15	Hong Kong	Diesel	TZ MK. III	4	PNG LNG
La Mancha Knutsen	176,300	Norspan LNG IX AS	HHI	Sep-16	Spain	ME-GI	Membrane	4	Portfolio

La Seine	174,000	Xiang Ch16 HK International	HHI	Feb-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Lalla Fatma N'Soumer	145,000	Algeria Nippon Gas	Kawasaki	Oct-04	Bahamas	Steam	Moss	4	Arzew
Lena River	155,000	Solana Holding Ltd.	HHI	Sep-13	Marshall Is.	DFDE	TZ Mk. III	4	Portfolio
Lijmiliya	263,300	Nakilat Lijmiliya Inc.	Daewoo	Dec-08	Marshall Is.	Diesel	GT NO 96	5	Qatargas II
LNG Abalamabie	162,000	Bonny Gas Transport Ltd.	Samsung	Jul-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Abuja II	162,000	Bonny Gas Transport Ltd.	Samsung	Mar-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Adamawa	141,000	Bonny Gas Transport Ltd.	HHI	Apr-05	Bermuda	Steam	Moss	4	NLNG
LNG Akwa Ibom	141,000	Bonny Gas Transport Ltd.	HHI	Oct-04	Bermuda	Steam	Moss	4	NLNG
LNG Alliance	154,472	NYK Armateur	STX	Mar-07	France	Diesel/Gas-Electric	CS1	4	Portfolio
LNG Aquarius	126,300	Hanochem Shipping Pt.	General Dynamics	Jan-77	Indonesia	Steam	Moss	5	Bontang
LNG Barka	155,982	Lloyds TSB General Leasing 3	Kawasaki	Dec-08	Bahamas	Steam	Moss	4	Oman LNG
LNG Bayelsa	137,500	Bonny Gas Transport Ltd.	HHI	Mar-03	Bermuda	Steam	Moss	4	NLNG
LNG Benue	145,952	BW Gas LNG Carriers Pte Ltd.	Daewoo	Apr-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Bonny Ii	174,000	Bonny Gas Transport Ltd.	HHI	Dec-15	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	NLNG
LNG Borno	149,600	Okra Shipping No. 1	Samsung	Aug-07	Bermuda	Steam	TZ Mk. III	4	NLNG
LNG Cross River	141,000	Bonny Gas Transport Ltd.	HHI	Aug-05	Bermuda	Steam	Moss	4	NLNG
LNG Dream	145,000	OJV Cayman 1 Ltd.	Kawasaki	Sep-06	Bahamas	Steam	Moss	4	North West Shelf
LNG Dubhe	174,000	Arctic Red LNG Shipping Ltd.	Hudong Zhonghua	Nov-19	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Ebisu	147,546	LNG Ebisu Shipping Corp.	Kawasaki	Jul-08	Bahamas	Steam	Moss	4	Pluto
LNG Enugu	145,926	BW Gas LNG Carriers Pte Ltd.	Daewoo	Oct-05	Bermuda	Steam	GT NO 96	4	NLNG
LNG Finima II	162,000	Bonny Gas Transport Ltd.	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Fukurokuju	164,700	LNG Fukurokuju Shipping Corp. .	Kawasaki	Jul-16	Bahamas	Steam	Moss	4	APLNG
LNG Imo	148,452	Bergesen LNG XI Pte Ltd.	Daewoo	Jun-08	Bermuda	Steam	GT NO 96	4	NLNG
LNG Jamal	135,333	Jamal Shipholding SA	Mitsubishi	Oct-00	Japan	Steam	Moss	5	Oman LNG
LNG Juno	180,000	Mog-X LNG Shipholding SA	Mitsubishi	Oct-18	Bahamas	STaGE	Moss	4	Freeport
LNG Jupiter	153,000	Lloyds TSB Equipment No. 7 Ltd.	Kawasaki	Jul-09	Bahamas	Steam	Moss	4	PNG LNG
LNG Jurojin	160,000	LNG Jurojin Shipping Corp. .	Mitsubishi	Nov-15	Bahamas	Steam	Moss	4	Portfolio
LNG Kano	148,565	Bergesen LNG IX Pte Ltd.	Daewoo	Jan-07	Bermuda	Steam	TZ MK. III	4	NLNG
LNG Kolt	153,595	KLT 5 International SA	Hanjin (Busan)	Dec-08	Panama	Steam	TZ Mk. III	4	Portfolio
LNG Lagos II	174,000	Bonny Gas Transport Ltd.	HHI	Jan-16	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Lerici	65,000	Portovenere & Lerici Pte Ltd.	Sestri Ponente	Apr-98	Singapore	Steam	GT NO 96	4	Malaysia LNG
LNG Lokoja	148,471	Bergesen LNG VIII Pte Ltd.	Daewoo	Nov-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Maleo	127,544	Nippon/Mitsui/Kawasaki	Mitsui E&S	Jan-89	Japan	Steam	Moss	4	North West Shelf
LNG Mars	155,693	Osaka Gas Int. & Mitsui OSK	Mitsubishi	Oct-16	Japan	Steam	Moss	4	PNG LNG
LNG Megrez	174,000	Arctic Indigo LNG Shipping Ltd.	Hudong Zhonghua	Nov-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Merak	174,000	Arctic Yellow LNG Shipping Ltd.	Hudong Zhonghua	Jan-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Ogun	149,000	Okra Shipping No. 2	Samsung	Jul-07	Bermuda	Steam	TZ Mk. III	4	NLNG
LNG Ondo	148,478	Bergesen LNG X Pte Ltd.	Daewoo	Sep-07	Bermuda	Steam	TZ MK. III	4	NLNG
LNG Oyo	145,842	BW Gas LNG Carriers Pte Ltd.	Daewoo	Jan-06	Bermuda	Steam	GT NO 96	4	NLNG
LNG Phecda	174,000	Arctic Orange LNG Shipping Ltd.	Hudong Zhonghua	Sep-20	Hong Kong	ME-GI	GTT NO96 L03+	4	Yamal
LNG Pioneer	138,121	M&S Shipping 3 SA	Daewoo	Jul-05	Bahamas	Steam	GT NO 96	4	Das Island
LNG Port-Harcourt II	162,000	Bonny Gas Transport Ltd.	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	4	NLNG
LNG Portovenere	65,000	Portovenere & Lerici Pte Ltd.	Sestri Ponente	Apr-97	Singapore	Steam	GT NO 96	4	Portfolio
LNG River Niger	141,000	Bonny Gas Transport Ltd.	HHI	Jul-06	Bermuda	Steam	Moss	4	NLNG
LNG River Orashi	145,914	BW Gas LNG Carriers Pte Ltd.	Daewoo	Nov-04	Bermuda	Steam	GT NO 96	4	NLNG
LNG Rivers	137,200	Bonny Gas Transport Ltd.	HHI	Jun-02	Bermuda	Steam	Moss	4	NLNG
LNG Rosenrot	176,523	MOL	DSME	Jan-21	Marshall Is.	X-DF	Membrane	4	Portfolio
LNG Sakura	177,000	LNG Sakura Shipping Corp.	Kawasaki	Feb-18	Bahamas	TFDE	Moss	4	Freeport
LNG Saturn	155,300	Mog-IX LNG Shipholding SA	Mitsubishi	Feb-16	Bahamas	Ultra Steam Turbine	Moss	4	Gorgon
LNG Schneeweisschen	180,000	LNG Rose Shipping Corp.	Daewoo	Sep-18	Panama	TFDE	TZ Mk. III Flex	4	Freeport
LNG Sokoto	137,425	Bonny Gas Transport Ltd.	HHI	Sep-02	Bermuda	Steam	Moss	4	NLNG
LNG Unity	154,472	Global LNG Armateur SAS	STX	Nov-06	France	Diesel/Gas-Electric	CS1	4	Portfolio
LNG Venus	153,000	Osaka Gas Int. & Mitsui OSK	Mitsubishi	Nov-14	Japan	Steam	Sayaendo	4	North West Shelf
LNG Vesta	127,386	Europe LNGT Co. Ltd.	Mitsubishi	Jun-94	Liberia	Steam	Moss	4	Portfolio
Lobito	160,276	Mint LNG III Ltd.	Samsung	Nov-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Lusail	145,000	Peninsula LNG Transport No. 1	Samsung	May-05	Bahamas	Steam	TZ Mk. III	4	RasGas II
Macoma	145,400	Compass Shipping 9 Corp. Ltd.	Daewoo	Sep-17	Bahamas	ME-GI	GT NO 96	4	Portfolio
Madrid Spirit	138,000	Teekay Gas IV SL	Navantia	Dec-04	Spain	Steam	GT NO 96	4	Atlantic LNG
Magdala	173,400	Hai Jiao 1606 Ltd.	Daewoo	Feb-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Magellan Spirit	165,500	Magellan Spirit Aps	Samsung	Apr-09	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Malanje	160,276	Mint LNG II Ltd.	Samsung	Oct-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Maran Gas Achilles	174,000	Adonis Investment Corp.	Hyundai Samho	Jan-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Agamemnon	174,000	Doris Navigation Inc.	Hyundai Samho	May-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Alexandria	161,870	Greenmare Navigation Corp.	Hyundai Samho	Oct-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Amphipolis	174,000	Nestor Navigation Corp.	Daewoo	Aug-16	Greece	DFDE	Membrane	4	Portfolio
Maran Gas Andros	173,400	Crusandel Marine Co.	Daewoo	Nov-19	Greece	ME-GI	GT NO 96	4	Freeport
Maran Gas Apollonia	161,870	Ilida Shipping Co. Ltd.	Hyundai Samho	Jan-14	Greece	Diesel Electric	TZ Mk. III	4	Punta Europa
Maran Gas Asclepius	145,000	Sea Satin Corp.	Daewoo	Jul-05	Greece	Steam	GT NO 96	4	RasGas II

Maran Gas Chios	170,000	Pleione Inc.	Daewoo	Mar-19	Greece	ME-GI	TZ Mk. III Flex	4	Data unavailable
Maran Gas Coronis	145,700	Jopica Shipping Co.	Daewoo	Jul-07	Greece	Steam	TZ MK. III	4	RasGas II
Maran Gas Delphi	159,800	Ada Shipholding Inc.	Daewoo	Feb-14	Greece	Diesel Electric	TZ Mk. III	4	Portfolio
Maran Gas Efessos	159,800	Acrogiali Shipping & Trading	Daewoo	Jun-14	Greece	DFDE	Membrane	4	Portfolio
Maran Gas Hector	174,000	Dylan Corp.	Hyundai Samho	Nov-16	Greece	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Maran Gas Hydra	173,400	Hai Jiao 1802 Ltd.	Daewoo	Feb-19	Greece	ME-GI	GT NO 96	4	Sabine Pass
Maran Gas Leto	174,000	Cherise Maritime Ltd.	Hyundai Samho	Mar-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Lindos	161,870	Olivia International Shpg Corp.	Daewoo	Jul-15	Greece	DFDE	Membrane	4	Punta Europa
Maran Gas Mystras	155,900	Blueskies Shipping Co. Ltd.	Daewoo	Aug-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Olympias	174,000	Cygnus Enterprises Inc.	Daewoo	Feb-17	Greece	ME-GI	GT NO 96	4	Portfolio
Maran Gas Pericles	173,400	Anguilla Navigation Corp.	Hyundai Samho	Aug-16	Greece	DFDE	TZ Mk. III	4	Portfolio
Maran Gas Posidonia	161,870	Felicite Navigation Inc.	Hyundai Samho	May-14	Greece	DFDE	Membrane	4	Punta Europa
Maran Gas Psara	173,595	Highseas Shiptrade Co.	Daewoo	May-20	Greece	ME-GI	GT NO96	4	Portfolio
Maran Gas Roxana	174,000	Elisa International Ltd.	Daewoo	Jan-17	Greece	ME-GI	TZ Mk. III	4	Portfolio
Maran Gas Sparta	159,800	Lettuce Maritime Corp.	Hyundai Samho	Apr-15	Greece	DFDE	Membrane	4	QCLNG
Maran Gas Spetses	173,400	Hai Jiao 1801 Ltd.	Daewoo	Jul-18	Greece	ME-GI	TZ Mk. III Flex	4	GoM
Maran Gas Troy	155,000	Helianthus Navigation Corp. .	Daewoo	Sep-15	Greece	DFDE	Membrane	4	Data unavailable
Maran Gas Ulysses	173,400	Ariel Sails Navigation SA	Hyundai Samho	Jan-17	Greece	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Maran Gas Vergina	174,000	Santa Lucia Enterprises Inc.	Daewoo	Dec-16	Greece	ME-GI	GT NO 96	4	Portfolio
Maria Energy	174,000	Canyon Trading Corp.	HHI	Sep-16	Liberia	Diesel/Gas-Electric	TZ Mk. III	4	Data unavailable
Marib Spirit	165,500	Membrane Shipping Ltd.	Samsung	Apr-08	Marshall Is.	Diesel/Gas-Electric	TZ Mk. III	4	Balhaf
Marshal Vasilevskiy	170,000	Gazprom Flot LLC	HHI	Jan-19	Russian Fed.	Diesel/Gas-Electric	Membrane	4	Kaliningrad LNG
Marvel Crane	177,000	Rosewood Shipping Pte Ltd.	Mitsubishi	Mar-19	Singapore	STaGE	Moss	4	Cameron
Marvel Eagle	155,000	Mevius Lines SA	Kawasaki	Oct-18	Panama	Reheat Steam Turbine	Moss	4	Cameron
Marvel Falcon	174,000	Tea Tree Shipping Pte Ltd.	Samsung	Apr-18	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Hawk	177,000	Comet Arrow Gas Transport	Samsung	Dec-18	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Heron	177,000	Heron Gas Shipping SA	Mitsubishi	Sep-19	Panama	STaGE	Moss	4	Cameron
Marvel Kite	177,000	Comet Gyro Gas Transport Pte	Samsung	Jan-19	Singapore	TFDE	TZ Mk. III Flex	4	Cameron
Marvel Pelican	156,265	Pelican Gas Shipping SA	Kawasaki	Dec-19	Panama	Reheat Steam Turbine	Moss	4	Cameron
Megara	173,400	Hai Jiao 1607 Ltd.	Daewoo	Jul-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Mekaines	266,000	Nakilat SHI 1695 Inc.	Samsung	Apr-09	Marshall Is.	DRL	TZ Mk. III	5	Qatargas III
Merchant	138,000	Ocean Tiger Shipping Ltd.	Samsung	Jul-03	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
Meridian Spirit	165,500	Meridian Spirit Aps	Samsung	Jan-10	Denmark	Diesel/Gas-Electric	TZ Mk. III	4	Hammerfest
Mesaimeer	216,312	Nakilat HHI 1908 Inc.	HHI	Mar-09	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas III
Methane Alison Victoria	145,000	Gas-Nineteen Ltd.	Samsung	Apr-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Becki Anne	170,000	Gas-Twenty Seven Ltd.	Samsung	Sep-10	Bermuda	TFDE	TZ Mk. III	4	Singapore
Methane Heather Sally	145,000	Gas-Twenty One Ltd.	Samsung	Jan-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Jane Elizabeth	145,000	Gas-Seventeen Ltd.	Samsung	Jun-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Julia Louise	170,000	Southern Route Maritime SA	Samsung	Apr-10	Bermuda	TFDE	TZ Mk. III	9	Singapore
Methane Kari Elin	138,267	Lombard Corporate December 1	Samsung	May-04	Bermuda	Steam	TZ Mk. III	4	Singapore
Methane Lydon Volney	145,000	Gas-Eighteen Ltd.	Samsung	Aug-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Mickie Harper	170,000	Methane Services Ltd.	Samsung	Dec-10	Bermuda	Diesel/Gas-Electric	TZ Mk. III	4	Singapore
Methane Nile Eagle	145,000	Egypt LNG Shipping Ltd.	Samsung	Dec-07	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Patricia Camila	170,000	Methane Services Ltd.	Samsung	Oct-10	Bermuda	TFDE	TZ Mk. III	4	Singapore
Methane Princess	138,000	Methane Services Ltd.	Daewoo	Aug-03	Bermuda	Steam	GT NO 96	4	Portfolio
Methane Rita Andrea	145,000	Gas-Sixteen Ltd.	Samsung	Apr-06	Bermuda	Steam	TZ Mk. III	4	Idku
Methane Shirley Elisabeth	145,000	Gas-Twenty Ltd.	Samsung	Feb-07	Bermuda	Steam	TZ Mk. III	4	Punta Europa
Methane Spirit	165,500	Methane Spirit LLC	Samsung	Feb-08	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Atlantic LNG
Milaha Qatar	145,500	Milaha Qatar GmbH & Co. KG	Samsung	Apr-06	Malta	Steam	TZ Mk. III	4	RasGas II
Milaha Ras Laffan	138,270	Milaha Ras Laffan GmbH & Co.	Samsung	Apr-04	Malta	Steam	TZ Mk. III	4	RasGas II
Minerva Kalymnos	174,000	Koje Shipping	Samsung	Feb-21	Malta	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Minerva Psara	173,400	Wimbledon Shipping	Daewoo	Jan-21	Malta	ME-GI	TZ Mk. III Flex Plus	4	Portfolio
Min Lu	147,100	Min Lu LNG Shipping Co. Ltd.	Hudong Zhonghua	Aug-09	Hong Kong	Steam	GT NO 96	4	Tangguh
Min Rong	145,000	Min Rong LNG Shipping Co. Ltd.	Hudong Zhonghua	Feb-09	Hong Kong	Steam	GT NO 96	4	Tangguh
Mozah	266,000	Nakilat Haloul Inc.	Samsung	Aug-09	Marshall Is.	Diesel	TZ Mk. III	5	Qatargas II
Mraweh	137,000	Mraweh Ltd.	STX	Apr-96	Liberia	Steam	Moss	4	Das Island
Mubaraz	137,000	Mubaraz Ltd.	STX	Dec-95	Liberia	Steam	Moss	4	Das Island
Murex	173,400	Hai Jiao 1605 Ltd.	Daewoo	Jul-17	Bahamas	ME-GI	GT NO 96	4	Portfolio
Murwab	210,100	J5 Nakilat No. 4 Ltd.	Daewoo	Jun-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Myrina	173,400	Xiang Ch1 HK International	Daewoo	May-18	Bahamas	ME-GI	GT NO 96	4	Portfolio
Neo Energy	150,000	Sea Optima SA	HHI	Jan-07	Liberia	Steam	Moss	4	Portfolio
Neptune	145,130	SRV Joint Gas Ltd.	Samsung	Nov-09	Norway	DFDE	TZ Mk. III	4	Portfolio
Nikolay Urvantsev	172,658	Dy Maritime Ltd.	Daewoo	Jul-19	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Nikolay Yevgenov	172,410	TC LNG Explorer III LLC	Daewoo	Apr-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Nikolay Zubov	172,410	Hai Kuo Shipping 1606 Ltd.	Daewoo	Nov-18	Cyprus	TFDE - Azipod	GT NO 96 GW	4	Yamal
Nizwa LNG	147,684	Oryx LNG Carrier SA	Kawasaki	Dec-05	Panama	Steam	Moss	4	Oman LNG
Nohshu Maru	180,000	Trans Pacific Shipping 5 Ltd.	Mitsubishi	Feb-19	Bahamas	Reheat Steam Turbine	Moss	4	Data unavailable
Northwest Sanderling	127,525	BHP/BP/Chevron/Japan & Others	Mitsubishi	Jan-89	Australia	Steam	Moss	4	North West Shelf

Northwest Sandpiper	125,042	BHP/BP/Chevron/Japan & Others	Mitsui E&S	Jan-93	Australia	Steam	Moss	4	North West Shelf
Northwest Snipe	127,500	BHP/BP/Chevron/Japan & Others	Mitsui E&S	Jan-90	Australia	Steam	Moss	4	North West Shelf
Northwest Stormpetrel	127,500	BHP/BP/Chevron/Japan & Others	Mitsubishi	Dec-94	Australia	Steam	Moss	4	North West Shelf
Oak Spirit	173,400	Sea 64 Leasing Co Ltd.	Daewoo	Mar-16	Bahamas	ME-GI	GT NO 96	4	Sabine Pass
Ob River	149,700	Lance Shipping SA	HHI	May-07	Marshall Is.	Steam	TZ Mk. III	4	Sakhalin II
Oceanic Breeze	155,300	Oceanic Breeze LNG Transport	Mitsubishi	Apr-18	Marshall Is.	Reheat Steam Turbine	Moss	4	Ichthys
Onaiza	210,150	Nakilat DSME 2266 Inc.	Daewoo	Apr-09	Marshall Is.	Diesel	GT NO 96	12	Qatargas III
Ougarta	170,000	Hyproc Shipping Co.	HHI	Mar-17	Algeria	DFDE	TZ Mk. III Flex	4	Arzew
Pacific Arcadia	145,400	Bahamas LNG Shipping Ltd.	Mitsubishi	Oct-14	Bahamas	Steam	Moss	4	PNG LNG
Pacific Breeze	180,000	Pacific Breeze LNG Transport	Kawasaki	Mar-18	Marshall Is.	TFDE	Moss	4	Ichthys
Pacific Enlighten	145,400	Pacific Hope Shipping Ltd.	Mitsubishi	Mar-09	Bahamas	Steam	Moss	4	North West Shelf
Pacific Eurus	137,000	Pacific Eurus Shipping	Mitsubishi	Mar-06	Bahamas	Steam	Moss	4	Das Island
Pacific Mimosa	155,300	Kaede Shipholding SA	Mitsubishi	Mar-18	Japan	Reheat Steam Turbine	Moss	4	Wheatstone
Pacific Notus	137,006	Pacific LNG Shipping	Mitsubishi	Sep-03	Bahamas	Steam	Moss	5	Darwin LNG
Palu LNG	159,800	Oceanus LNG Gamma LLC	Daewoo	Nov-14	Malta	TFDE	GT NO 96	4	Spot
Pan Africa	174,000	Pan Africa LNG Transportation	Hudong Zhonghua	Jan-19	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Americas	174,000	Pan Americas LNG Trans	Hudong Zhonghua	Jan-18	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Asia	174,000	Pan Asia LNG Transportation	Hudong Zhonghua	Sep-17	Hong Kong	TFDE	GT NO 96	4	QCLNG
Pan Europe	174,000	Pan Europe LNG Transportation	Hudong Zhonghua	Jul-18	Hong Kong	TFDE	GT NO 96	4	QCLNG
Papua	170,000	Aquarius LNG Shipping Ltd.	Hudong Zhonghua	Nov-14	Hong Kong	DFDE	TZ MK. III	4	PNG LNG
Patris	174,000	Artemis Gas 1 Shipping Inc.	Daewoo	Jan-18	Liberia	ME-GI	GT NO 96	4	Freeport
Pearl LNG	174,000	Cardiff LNG Delta Owning LLC	HHI	Aug-20	Malta	X-DF	NO-96-GW+PRS	4	Portfolio
Point Fortin	154,200	Los Halillos Shipping Co. SA	Koyo Dockyard	Jan-10	Panama	Steam	TZ Mk. III	4	Portfolio
Polar Spirit	89,800	Polar Spirit LLC	Ishikawajima	Jun-93	Bahamas	Steam	IHI SPB	4	Atlantic LNG
Portovyy	138,107	Global LNG Ltd.	Daewoo	Aug-03	Malta	Steam	GT NO 96	4	Portfolio
Prachi	162,000	India LNG Transport Co. No. 4	HHI	Nov-16	Singapore	Diesel/Gas-Electric	TZ Mk. III	4	Gorgon
Prism Agility	180,000	HHI ENS1 Shipholding SA	HHI	May-19	Panama	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Prism Brilliance	180,000	HHI ENS2 Shipholding SA	HHI	May-19	Panama	X-DF	TZ Mk. III Flex Plus	4	Portfolio
Pskov	170,200	Scalpay Shipping Ltd.	STX	Sep-14	Liberia	DFDE	GT NO 96	4	Portfolio
Puteri Delima	130,400	Puteri Delima Sdn Bhd.	STX	Jan-95	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Delima Satu	137,100	Puteri Delima Satu L Pte Ltd.	Mitsui E&S	Oct-02	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Firus Satu	137,100	Puteri Firus Satu	Mitsubishi	Aug-04	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Intan	137,100	Puteri Intan Sdn Bhd.	STX	Aug-94	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Intan Satu	137,100	Puteri Intan Satu L Pte Ltd.	Mitsubishi	Aug-02	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Mutiara Satu	137,100	Puteri Mutiara Satu	Mitsui E&S	Apr-05	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Nilam	130,400	Puteri Nilam Sdn Bhd.	STX	Jul-95	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Nilam Satu	137,100	Puteri Nilam Satu L Pte Ltd.	Mitsubishi	Jul-03	Malaysia	Steam	GT NO 96	4	MLNG III
Puteri Zamrud	130,400	MISC Bhd.	STX	Jun-96	Malaysia	Steam	GT NO 96	4	MLNG II
Puteri Zamrud Satu	137,100	Puteri Zamrud Satu L Pvt Ltd.	Mitsui E&S	Feb-04	Malaysia	Steam	GT NO 96	4	MLNG III
Qogir	174,000	Xiang Ch15 HK International	Samsung	Jun-20	Malta	X-DF	TZ MK. III Flex	4	Portfolio
Raahi	138,076	India LNG Transport Co. No. 2	Daewoo	Oct-04	Malta	Steam	GT NO 96	4	RasGas
Ramdane Abane	126,130	Hyproc Shipping Co.	STX	Jun-81	Algeria	Steam	GT NO 85	5	Arzew
Rasheeda	266,000	Nakilat SHI 1754 Inc.	Samsung	Aug-10	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Rias Baixas Knutsen	180,000	Knutsen OAS Espana SL	HHI	Sep-19	Spain	ME-GI	TZ Mk. III Flex Plus	4	Corpus Christi
Ribera Del Duero Knutsen	173,400	Norspan LNG VIII AS	Daewoo	Dec-10	Norway	DFDE	GT NO 96	4	Portfolio
Rioja Knutsen	170,000	Norspan LNG X As	HHI	Dec-16	Spain	ME-GI	TZ Mk. III	4	Portfolio
Rudolf Samoylovich	172,410	TC LNG Explorer II LLC	Daewoo	Aug-18	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Saga Dawn	45,000	Saga LNG Shipping Pte Ltd.	China Merchants H.I.	Aug-19	Singapore	Diesel/Gas-Electric	TZ MK. III Flex	4	Data unavailable
Salalah LNG	147,000	Tiwi LNG Carrier SA	Samsung	Dec-05	Panama	Steam	TZ Mk. III	4	Oman LNG
SCF Barents	174,000	Heliconia Maritime SA	HHI	Sep-20	Liberia	DFDS	TZ Mk. III Flex	4	Portfolio
SCF La Perouse	174,000	Albus Shipping Ltd.	HHI	Feb-20	Liberia	X-DF	NO-96-GW+PRS	4	Portfolio
SCF Melampus	170,200	Pabbay Shipping Ltd.	STX	Jan-15	Liberia	Diesel Electric	Membrane	4	Portfolio
SCF Mitre	170,200	Ensay Shipping Ltd.	STX	Apr-15	Liberia	Diesel Electric	Membrane	4	Portfolio
SCF Timmerman	170,551	Sovcomflot	HHI	Jan-21	Liberia	X-DF	NO-96-GW+PRS	4	Portfolio
Sean Spirit	174,162	HHI Hull No. S856 LLC	Hyundai Samho	Dec-18	Bahamas	ME-GI	TZ Mk. III Flex	4	Freeport
Seishu Maru	138,000	Trans Pacific Shipping 1 Ltd.	Mitsubishi	Sep-14	Bahamas	Steam	Moss	4	PNG LNG
Senshu Maru	127,167	Nippon/Mitsui/Kawasaki	Mitsui E&S	Feb-84	Japan	Steam	Moss	5	Bontang
Seri Alam	145,572	MISC Bhd.	Samsung	Jul-05	Malaysia	Steam	Moss Seri-C	4	Bintulu
Seri Amanah	145,709	MISC Bhd.	Samsung	Mar-06	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Anggun	145,731	MISC Bhd.	Samsung	Oct-06	Malaysia	Steam	TZ Mk. III	4	North West Shelf
Seri Angkasa	145,130	MISC Bhd.	Samsung	Dec-06	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Ayu	145,894	MISC Bhd.	Samsung	Oct-07	Malaysia	Steam	TZ Mk. III	4	Bintulu
Seri Bakti	152,944	MISC Bhd.	Mitsubishi	Apr-07	Malaysia	Steam	TZ MK. III	4	Gladstone
Seri Balhaf	152,000	MISC Bhd.	Mitsubishi	Jan-09	Malaysia	Steam	TZ MK. III	4	Bontang
Seri Balqis	152,000	MISC Bhd.	Mitsubishi	Mar-09	Malaysia	Steam	TZ MK. III	4	NLNG
Seri Begawan	152,900	MISC Bhd.	Mitsubishi	Nov-07	Malaysia	Steam	TZ MK. III	4	Bintulu
Seri Bijaksana	152,300	MISC Bhd.	Mitsubishi	Apr-08	Malaysia	Steam	TZ MK. III	4	Bintulu
Seri Camar	150,000	Seri Camar L Pte Ltd.	HHI	Feb-18	Malaysia	Ultra Steam Turbine	Moss	4	Pacific Northwest

Seri Camellia	159,800	Seri Camellia L Pte Ltd.	HHI	Sep-16	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Seri Cemara	150,200	Seri Cemara L Pte Ltd.	HHI	Apr-18	Malaysia	Reheat Steam Turbine	Moss	4	Portfolio
Seri Cempaka	162,000	Seri Cempaka L Pte Ltd.	HHI	Aug-17	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Seri Cenderawasih	162,000	Seri Cenderawasih L Pvt Ltd.	HHI	Feb-17	Malaysia	Steam	Moss Seri-C	4	Pacific Northwest
Sestao Knutsen	136,947	Norspan LNG IV AS	Navantia Cadiz	Oct-07	Spain	Steam	TZ MK. III	4	Portfolio
Sevilla Knutsen	173,400	Norspan LNG VI AS	Daewoo	May-10	Spain	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Shagra	268,000	Nakilat SHI 1751 Inc.	Samsung	Nov-09	Marshall Is.	Diesel	TZ Mk. III	10	Qatargas IV
Shahamah	135,496	Shahamah Inc.	Kawasaki	Oct-94	Liberia	Steam	Moss	5	Das Island
Shen Hai	147,200	Shanghai LNG Shipping Co. Ltd.	Hudong Zhonghua	Dec-12	Hong Kong	Steam	TZ MK. III	4	Bintulu
Shinshu Maru	180,000	Trans Pacific Shipping 7 Ltd.	Kawasaki	Feb-19	Bahamas	DERST	Moss	4	Freeport
Simaisma	145,889	Greenwell Corp.	Daewoo	Jul-06	Greece	Steam	GT NO 96	8	RasGas II
Singapore Energy	138,000	KSF Global No. 6 SA	Samsung	Feb-03	Marshall Is.	Steam	TZ Mk. III	4	Portfolio
SK Audace	174,000	Milestone LNG Transport SA	Samsung	Aug-17	Panama	X-DF	TZ Mk. III	4	Portfolio
SK Resolute	180,000	Great Shale LNG Transport SA	Samsung	Nov-17	Panama	X-DF	TZ Mk. III	4	Ichthys
SK Serenity	174,000	Shikc 1 Shipholding SA	Samsung	Feb-18	Panama	TFDE	KC-1	4	Sabine Pass
SK Spica	174,117	Shikc 2 Shipholding SA	Samsung	Mar-18	Panama	TFDE	KC-1	4	Sabine Pass
SK Splendor	138,370	SK Shipping Co. Ltd. -Krs	Samsung	May-00	South Korea	Steam	TZ Mk. III	4	Oman LNG
SK Stellar	138,375	Stellar Shipholding SA	Samsung	Dec-00	Panama	Steam	TZ Mk. III	4	RasGas I
SK Summit	138,003	SK Shipping Co. Ltd. -Krs	Daewoo	Aug-99	South Korea	Steam	GT NO 96	4	RasGas I
SK Sunrise	138,306	Methane Navigation SA	Samsung	Aug-03	Panama	Steam	TZ Mk. III	4	RasGas II
SK Supreme	138,225	SK Shipping Co. Ltd. -Krs	Samsung	Feb-00	South Korea	Steam	TZ Mk. III	4	RasGas I
SM Eagle	174,000	SMKLC LNG1 SA	Daewoo	May-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
SM Seahawk	174,000	SMKLC LNG2 SA	Daewoo	Jun-17	Panama	ME-GI	TZ Mk. III Flex	4	Sabine Pass
Sohar LNG	137,248	Energy Spring LNG Carrier SA	Mitsubishi	Oct-01	Panama	Steam	Moss	5	Oman LNG
Sohshu Maru	177,000	Trans Pacific Shipping 8 Ltd.	Kawasaki	Jul-19	Bahamas	DERST	Moss	4	Freeport
Solaris	155,000	Gas-Eight Ltd.	Samsung	Jul-14	Bermuda	Diesel/Gas-Electric	Membrane	4	Spot
Sonangol Benguela	160,500	Sonangol Benguela Ltd.	Daewoo	Dec-11	Bahamas	Steam	GT NO 96	4	Soyo
Sonangol Etosha	160,500	Sonangol Etosha Ltd.	Daewoo	Sep-11	Bahamas	Steam	GT NO 96	4	Soyo
Sonangol Sambizanga	160,500	Sonangol Sambizanga Ltd.	Daewoo	Aug-11	Bahamas	Steam	GT NO 96	4	Soyo
Southern Cross	172,000	Aries LNG Shipping Ltd.	Hudong Zhonghua	Jul-15	Hong Kong	DRL	TZ Mk. III	4	PNG LNG
Soyo	160,276	Mint LNG I Ltd.	Samsung	Aug-11	Bahamas	DFDE	TZ Mk. III	4	Soyo
Spirit Of Hela	177,000	Nefertiti LNG Shipping Co. Ltd.	Hyundai Samho	Nov-10	Bahamas	Diesel Electric	TZ Mk. III	4	PNG LNG
Stena Blue SKy	145,700	Blue Shipping KB	Daewoo	Aug-06	U.K.	Steam	GT NO 96	4	Spot
Stena Clear Sky	171,800	Clear Sky KB	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Stena Crystal SKy	171,800	Crystal Sky KB	Daewoo	May-11	U.K.	Diesel/Gas-Electric	GT NO 96	4	Portfolio
Symphonic Breeze	145,394	Reborn Maritime SA	Kawasaki	Dec-07	Bahamas	Steam	Moss	4	Portfolio
Taitar No. 1	145,000	NIMIC No. 1 SA	Mitsubishi	Oct-09	Panama	Steam	Moss	4	RasGas
Taitar No. 2	145,000	NIMIC No. 2 SA	Kawasaki	Dec-09	Panama	Steam	Moss	4	RasGas
Taitar No. 3	145,000	NIMIC No. 3 SA	Mitsubishi	Dec-09	Panama	Steam	Moss	4	RasGas
Taitar No. 4	147,000	NIMIC No. 4 SA	Kawasaki	Aug-10	Panama	Steam	Moss	4	RasGas
Tangguh Batur	145,700	LNG North-South Shipping Co.	Daewoo	Dec-08	Singapore	Steam	TZ MK. III	4	Tangguh
Tangguh Foja	155,000	Ocean1919 Shipping No. 1 SA	Samsung	Nov-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Hiri	155,000	Tangguh Hiri Finance Ltd.	HHI	Dec-08	Bahamas	DFDE	TZ Mk. III	4	Tangguh
Tangguh Jaya	155,000	Ocean1919 Shipping No. 2 SA	Samsung	Dec-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Palung	155,000	Ocean1919 Shipping No. 3 SA	Samsung	Mar-09	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Sago	155,000	Tangguh Sago Finance Ltd.	Hyundai Samho	Dec-08	Bahamas	Diesel/Gas-Electric	TZ Mk. III	4	Tangguh
Tangguh Towuti	145,700	LNG East-West Ship Singapore	Daewoo	Oct-08	Singapore	Steam	TZ MK. III	4	Tangguh
Tembek	216,200	Overseas LNG S1 Corp.	Samsung	Nov-07	Marshall Is.	Diesel	TZ Mk. III	4	Qatargas II
Tessala	170,000	Hyproc Shipping Co.	HHI	Feb-17	Algeria	Diesel/Gas-Electric	TZ Mk. III Flex	4	Arzew
Torben Spirit	173,400	Sea 168 Leasing Co. Ltd.	Daewoo	Nov-16	Bahamas	ME-GI	GT NO 96	4	Portfolio
Trader	138,000	Lloyds Industrial Leasing	Samsung	Nov-02	Isle of Man	Steam	TZ Mk. III	4	Portfolio
Traiano Knutsen	180,000	Hai Kuo Shipping 1901 G Ltd.	HHI	Jul-20	Norway	ME-GI	TZ Mk. III Flex Plus	4	Portfolio
Trinity Arrow	154,982	Cypress/Luster/Los Halillos	Koyo Dockyard	Feb-08	Panama	Steam	TZ Mk. III	4	Portfolio
Trinity Glory	154,000	Cypress/Luster/Los Halillos	Koyo Dockyard	Nov-08	Panama	Steam	TZ Mk. III	4	Bontang
Tristar Ruby	155,000	Sg Leasing Gems Ltd.	HHI	Apr-08	Liberia	Diesel/Gas-Electric	TZ Mk. III	4	Portfolio
Umm Al Amad	210,200	J5 Nakilat No. 7 Ltd.	Daewoo	Sep-08	Marshall Is.	Diesel	GT NO 96	18	RasGas III
Umm Al Ashtan	137,000	Umm Al Ashtan Ltd.	STX	May-97	Liberia	Steam	Moss	4	Das Island
Umm Bab	145,000	Sea Trade International	Daewoo	Nov-05	Greece	Steam	GT NO 96	4	RasGas II
Umm Slal	266,000	Shi Hull No. 1676 Inc.	Samsung	Nov-08	Marshall Is.	DFDE	TZ Mk. III	5	Qatargas II
Valencia Knutsen	173,400	Norspan LNG VII AS	Daewoo	Sep-10	Spain	DFDE	GT NO 96	4	Portfolio
Velikiy Novgorod	170,200	Boreray Shipping Ltd.	STX	Dec-13	Liberia	DFDE	GT NO 96	4	Portfolio
Vivit Americas LNG	180,000	Cardiff LNG Zeta Owning LLC	HHI	Oct-20	Malta	X-DF	TZ Mk. III Flex	4	Portfolio
Vladimir Rusanov	174,000	DY Maritime Ltd.	Daewoo	Jan-18	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Vladimir Vize	172,000	Dy Maritime Ltd.	Daewoo	Sep-18	Hong Kong	ME-GI	GT NO 96 GW	4	Yamal
Vladimir Voronin	172,652	TC LNG Explorer IV LLC	Daewoo	Jul-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Wilforce	155,900	Compass Shipping 84 Corp. Ltd.	Daewoo	Sep-13	Norway	DFDE	GT NO 96	4	Data unavailable
Wilpride	155,900	Compass Shipping 85 Corp. Ltd.	Daewoo	Nov-13	Norway	DFDE	GT NO 96	4	N/A
Woodside Chaney	174,000	Lamkos Seaways Ltd.	Daewoo	Jul-19	Greece	ME-GI	TZ MK. III Flex	4	Portfolio

Woodside Charles Allen	173,400	Newberry Shiptrade Ltd.	Daewoo	Oct-20	Greece	ME-GI	Membrane	4	Portfolio
Woodside Donaldson	165,500	Malt Singapore Pte Ltd.	Samsung	Oct-09	Singapore	Diesel/Gas-Electric	TZ Mk. III	4	Pluto
Woodside Goode	159,800	Armour Co. Ltd.	Daewoo	Nov-13	Greece	Diesel Electric	GT NO 96	4	RasGas
Woodside Rees Withers	173,400	Franklin Navigation Co.	Daewoo	Oct-19	Greece	ME-GI	GT NO 96	4	Data unavailable
Woodside Rogers	159,800	Margie Seaway Corp.	Daewoo	Jul-13	Greece	Diesel/Gas-Electric	GT NO 96	4	Pluto
Yakov Gakkel	172,658	TC LNG Explorer VI LLC	Daewoo	Nov-19	Bahamas	ME-GI	GT NO 96 GW	4	Yamal
Yamal Spirit	174,000	Xiang Ch2 HK International	Hyundai Samho	Jan-19	Bahamas	ME-GI	TZ Mk. III Flex	4	Freeport
Yari LNG	159,800	Oceanus LNG Delta LLC	Daewoo	Nov-14	Malta	TFDE	GT NO 96	4	Spot
Yenisei River	155,000	Navajo Marine Ltd.	HHI	Jul-13	Marshall Is.	DFDE	TZ Mk. III	4	Yamal
YK Sovereign	127,125	SK Shipping Co. Ltd. -Krs	HHI	Dec-94	South Korea	Steam	Moss	4	MLNG
Zarga	268,000	Nakilat SHI 1752 Inc.	Samsung	Jan-10	Marshall Is.	DRL	TZ Mk. III	5	Qatargas IV
Zekreet	137,482	Mitsui/Nippon/Kawasaki/Iino	Mitsui E&S	Dec-98	Japan	Steam	Moss	5	Qatargas I

Fleet – LNG Bunkering

Name	Built	Capacity	Registered Owner	Builder	Flag	Engine Type	Cargo System	No. of tanks	Project
Seagas	Sep-74	170	Linde Gas AB	Havyard Leirvik	Sweden	Diesel	Cylinder	1	Stockholm Viking Line
Coral Methane	Apr-09	7,551	Coral Methane Shipping BV	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinder	4	Portfolio
Oizmendi	Jul-09	600	Itsas Gas Bunker Supply SL	Astilleros Zamakona	Spain	Diesel	Cylinder	2	Huelva
Green Zeebrugge	Feb-17	5,000	LNG Link Investment AS	Hanjin Heavy Industries	Belgium	Diesel/Gas-Electric	Cylinder	2	Zeebrugge
Cardissa	Jun-17	6,500	Shell Western LNG BV	STX	Netherlands	Diesel/Gas-Electric	Cylinder	1	Portfolio
Coralius	Aug-17	5,800	Sirius Veder Gas AB	Bodewes Shipyards	Sweden	DFDE	Cylinder	4	Portfolio
Kairos	Oct-18	7,500	Uranos Vermogensverwaltung	Hyundai Mipo	Cyprus	Gas-Diesel	Type C	4	Portfolio
Bunker Breeze	Oct-18	6,050	Molucas Naviera AIE	Astilleros Zamakona	Spain	Gas-Diesel	Cylinder	4	Algeciras
LNG London	Apr-19	3,000	LNG Shipping S.A.	Severnav S.A.	Belgium	LNGPac	Cylinder	6	ARA
SM Jeju LNG 1	Sep-19	7,500	Jeju LNG 1 S.A.	Samsung	Panama	Diesel/Gas-Electric	KC-1	1	Portfolio
SM Jeju LNG 2	Jan-20	7,500	Jeju LNG 2 S.A.	Samsung	Panama	Diesel/Gas-Electric	KC-1	1	Portfolio
Gas Agility	Apr-20	18,600	Emerald Green Maritime Ltd.	Hudong Zhonghua	Malta	DFDE	TZ Mk III Flex	2	Rotterdam
Kaguya	Sep-20	3,469	Central LNG Shipping Japan	Kawasaki	Japan	Gas-Diesel	Cylinder	1	JERA TPS
Avenir Advantage	Oct-20	7,500	Avenir L Pte Ltd.	Keppel Nantong	Malta	Gas-Diesel	Type C	2	Portfolio
Avenir Accolade	Nov-20	7,500	Stolt-Nielsen Gas Ltd.	Keppel Nantong	Malta	Gas-Diesel	Type C	2	Portfolio
FueLNG Bellina	Nov-20	7,500	FueLNG Pte Ltd.	Kappel Nantong	Singapore	Diesel/Gas-Electric	Cylinder	2	Portfolio
Dalian No. 1	Dec-20	8,330	Xinao Marine Shipping Co. Ltd.	Dalian Yard	China	Gas-Diesel	Cylinder	2	Portfolio
Marine Vicky	Jan-20	9,900	Sinanju Tankers Pte. Ltd.	Keppel Nantong	Singapore	Gas-Diesel	TBC	TBC	Portfolio
Imperial Gas 92	Oct-17	3,800	Imperial Logistics International BV & Co. KG	Centromost	Germany	Diesel	Cylinder	TBC	Portfolio
Imperial Gas 93	Nov-17	3,800	Imperial Logistics International BV & Co. KG	Centromost	Germany	Diesel	Cylinder	TBC	Portfolio

Fleet – Small-scale/Multipurpose

Name	Built	Capacity	Registered Owner	Builder	Flag	Engine Type	Cargo System	No. of tanks	Project
Akebono Maru	Jun-11	3,500	Chuo Kaiun K.K.	Higaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Aman Sendai	May-97	18,928	Asia LNG Transport	NKK	Malaysia	Steam	TZ Mk. III	3	Malaysia LNG
Coral Acropora	Dec-12	6,573	Coral Acropora Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Actinia	Jan-13	6,573	Coral Actinia Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Alicia	Dec-12	6,573	Coral Alicia Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Anthelia	May-13	6,500	Coral Anthelia Shipping	AVIC Dingheng	Netherlands	Gas-Diesel	Cylinders	4	Portfolio
Coral Energice	Feb-18	18,000	Anthony Veder Chartering	Neptun Werft	Netherlands	Gas-Diesel	TZ MK. III Flex	2	Portfolio
Coral Energy	Dec-12	15,600	Anthony Veder Rederijzaken	Meyer Werft	Netherlands	Gas-Diesel	IMO Type C	3	Portfolio
Coral Fraseri	Jan-10	10,000	Innovation Shipping Co.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Portfolio
Coral Furcata	Nov-11	10,000	Conception Shipping Company	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Portfolio
Kakurei Maru	Nov-08	2,536	Tsurumi Sunmarine Co.	Higaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Kakuyu Maru	Nov-13	2,538	Tsurumi Sunmarine Co.	Kawasaki	Japan	Diesel	Cylinders	1	Japan coastal trade
Lucia Ambition	Dec-93	18,927	Asia LNG Transport	NKK	Malaysia	Steam	TZ Mk. III	3	Malaysia-Hainan
Seoul Gas	Jul-98	4,365	Chemgas Schiffahrts GmbH & Co. mt Oste KG	Severnav Shipbuilding	Liberia	Diesel	Cylinders	2	S. Korea-China
Coral Favia	Jul-10	10,000	Somargas II Pvt. Ltd.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Baltic portfolio
Coral Fungia	Jan-11	10,000	Somargas II Pvt. Ltd.	Wuzhou Shipbuilding	Singapore	Diesel	Cylinders	2	Baltic portfolio
Unikum Spirit	Jun-11	12,000	DHJS Hull No.2007-001 LLC	AVIC Dingheng	Singapore	Diesel	Cylinders	2	Kuantan
North Pioneer	Nov-05	2,500	Japan Liquid & Gas Transport Co. & Japan Railway Agency	Shin Kurushima	Japan	Diesel	Cylinders	2	Japan coastal trade
Pioneer Knutsen	Mar-04	1,100	Knutsen Kyst LNG K/S	Bijlsma Lemmer B.V. Scheepswerf	Norway	LNG-Diesel	Cylinders	2	Norway coastal trade
Shinju Maru No. 1	Aug-03	2,538	JRTT & NS United Coastal Tankers	Kawasaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Shinju Maru No. 2	Oct-08	2,536	Chuo Kaiun K.K.	Higaki	Japan	Diesel	Cylinders	2	Japan coastal trade
Sun Arrows	Sep-07	19,531	Maple LNG Transport Inc.	Kawasaki	Bahamas	Diesel	Moss	3	Malaysia LNG
Surya Aki	Feb-96	19,538	MCGC International Limited & Hiroshima Gas Co.	Kawasaki	Bahamas	Steam	Moss	3	Thanlyin LNG
Triputra	Dec-00	23,097	Nusantara Shipping	NKK	Indonesia	Steam	TZ Mk. III	3	Pertamina Portfolio
Vision Spirit	Sep-11	12,000	I.M. Skaugen Marine Services	AVIC Dingheng	Singapore	Diesel	Cylinders	2	Portfolio
Hai Yang Shi You 301	Apr-15	30,000	COSL	Jiangnan Shipyard	China	Gas-Diesel	Membrane	4	Hainan LNG shuttle

Any observations, additions or suggested revisions to the LNG journal World LNG Carrier Fleet list should be sent to editor@lngjournal.com

LNG Import Terminals

Explanatory Notes

- The tables do not include the following types of LNG facilities :
  - Small marine satellite terminals receiving LNG from liquefaction plants in their own country (such as exist in Norway) or which receive LNG transhipped from nearby reception terminals in their own country (such as in Japan)
  - Satellite LNG storage facilities that receive LNG transported only by road or rail
- Expansions of LNG reception terminals are only shown if they involve new storage tanks
- Where there is a blank in the table the information is uncertain or unknown.

Any comments on the tables, and corrections / additional information from terminal shareholders and project developers would be most welcome, and should be sent to John McKay e-mail editor@lngjournal.com

Country	Location (Project)	Owners	Start up	Storage Tanks	Storage Capacity
Belgium	Zeebrugge	Fluxys	1987	4	380,000
Canada	Canaport Saint John	Irving Oil, Repsol	2009	3	480,000
Chile	Quintero	ENAP, Metrogas, Enagas	2009	3	334,000
	Mejillones	Engie, Ameris Capital AGF	2010	1	175,000
China	Beihai LNG, Guangxi	Sinopec	2015	4	640,000
	Dalian	PetroChina	2011	3	480,000
	Dapeng ND Guangdong	CNOOC	2018	4	640,000
	Dongguan, Guangdong	Jovo Group	2013	2	160 000
	Fujian LNG (Xiuyu)	CNOOC, Fujian I&D Corp.	2008	2	640,000
	Guangdong	CNOOC,BP	2006	3	480,000
	Haikou, Hainan LNG	CNOOC	2014	3	480,000
	Ningbo, Zheijang	CNOOC, Zhejiang Energy	2012	3	480,000
	Qidong, Jiangsu	Guanghui Energy	2018	1	60,000
	Qingdao, Shandong	Sinopec	2014	3	480,000
	Rudong	PetroChina	2011	3	530,000
	Shanghai	CNOOC, Shenergy Group	2009	3	495,000
	Shanghai, Mengtougou	Shanghai Gas	2008	3	120 000
	Shenzen, Diefu	CNOOC	2016	2	320,000
	Tangshan, Hebei	PetroChina	2013	3	480,000
	Tianjin North	Sinopec	2017	2	320,000
	Yuedong, Guangdong	CNOOC	2016	2	320,000
	Zhoushan Zhejiang	Enn Group	2018	2	320,000
	Zhuhai, Gaolan	CNOOC	2013	3	480,000
Dominican Republic	Punta Caucedo	AES Andres	2003	1	160 000
Finland	Pori	Gasum Skangas	2016	1	30,000
	Tornio	Gasum Skangas	2018	1	30,000
France	Fos Tonkin	Elengy	1972	3	150,000
	Montoir-de-Bretagne	Elengy	1980	3	360,000
	Fos Cavaou	Engie, Total	2010	3	330,000
	Dunkirk LNG	EDF, Fluxys, Total	2016	3	570,000
Gibraltar	Gasnor	Shell	2018	1	5,000
Greece	Revithoussa	DEPA	2000	3	225,000
India	Dabhol	GAIL, NTPC (Ratnagiri Gas & Power)	2009	3	480,000
	Dahej	Petronet LNG	2004	4	592,000
	Hazira	Shell India, Total	2005	2	320,000
	Kochi, Kerala	Petronet LNG	2013	2	320,000
	Mundra	Gujarat State Petroleum, Adani Group	2018	2	320,000
	Kamarajar (Ennore), Tamil Nadu	Indian Oil, DFC, ICICI Bank	2019	2	360,000
Indonesia	Arun	Pertamina	2015	5	507,000
Italy	Panigaglia	Snam	1969	2	100,000
	Porto Levante (offshore GBS)	ExxonMobil, Qatar Petroleum, Edison Gas	2009	2	250,000
Jamaica	Montego Bay	New Fortress	2018	1	7,000
Japan	Negishi	Tokyo Gas	1969	14	1,180,000
	Sodegaura	Tokyo Gas JERA Co. Inc	1973	35	2,660,000
	Ohgishima	Tokyo Gas	1998	4	850,000
	Higashi-Ohgishima	JERA Co. Inc.	1984	9	540,000
	Futtsu	JERA Co. Inc.	1985	10	1,360,000
	Yokkaichi LNG	JERA Co. Inc.	1988	4	320,000
	Kawagoe	JERA Co. Inc.	1997	6	840,000
	Yokkaichi Works	Toho Gas	1991	2	160,000
	Chita LNG Joint	Toho Gas, Chubu Electric	1978	4	300,000
	Chita LNG	Toho Gas, Chubu Electric	1983	7	640,000
	Chita - Midorihama	Toho Gas	2001	3	600,000
	Senboku I	Osaka Gas	1972	4	180,000
	Senboku II	Osaka Gas	1977	18	1,585,000
	Himeji	Osaka Gas	1984	8	740,000
	Himeji LNG	Kansai Electric	1979	7	520,000
	Yanai	Chugoku Electric	1990	6	480,000
	Niigata	Nihonkai LNG, Tohoku Electric	1984	8	720,000
	Oita	Oita Gas, Kyushu Electric	1990	5	460,000
	Tobata	Kitakyushu LNG	1977	8	480,000
	Fukuoka	Saibu Gas	1993	2	70,000
	Sodeshi	Shizuoka Gas	1996	3	337,200
	Hatsukaichi	Hiroshima Gas	1996	2	170,000
	Kagoshima	Nippon Gas	1996	2	136,000
	Shin-Minato	Sendai City Gas	1997	1	80,000
	Nagasaki	Saibu Gas	2003	1	36,000
	Sakai	Kansai Electric, Cosmo OII	2006	3	420,000
	Mizushima	Nippon Oil, Chugoku Electric	2006	2	320,000

LNG Import Terminals (continued)

Country	Location (Project)	Owners	Start up	Storage Tanks	Storage Capacity
	Sakaide	Shikoku Electric, Cosmo Oil	2011	1	180,000
Japan (continued)	Ishikari LNG	Hokkaido Gas, Hokkaido Electric	2012	2	380,000
	Okinawa	Okinawa Electric Power	2012	2	280,000
	Naoetsu	Inpex	2013	2	360,000
	Joetsu	JERA Co. Inc.	2011	3	540,000
	Hachinohe LNG	Nippon Oil	2015	2	280,000
	Hitachi LNG	Tokyo Gas	2015	1	230,000
	Soma Fukushima	Japan Petroleum Exploration	2017	1	225,000
Korea	Boryyeong	GS Energy, SK E&S	2017	3	200,000
	Incheon	Kogas	1996	20	2,880,000
	Kwangyang	POSCO SK E&S	2005	4	530,000
	Pyeong-Taek	Kogas	1986	23	3,360,000
	Samcheok	Kogas	2014	3	600,000
	Tong-Yeong	Kogas	2002	17	2,620,000
	Jeju	Kogas	2019	2	90,000
Malaysia	Pengerang Johor	Petronas Gas	2017	2	400,000
Mexico	Altamira	Vopak, Enagas	2006	2	300,000
	Energia Costa Azul	Sempra LNG	2008	2	320,000
	Manzanillo	Samsung, Kogas, Mitsui	2012	2	300,000
Netherlands	Gate LNG	Gasunie, Royal Vopak	2011	3	540,000
Panama	Costa Norte	AES	2018	1	130,000
Phillipines	Pagbilao LNG	Energy World Corp.	2017	1	130,000
Poland	Swinoujscie	Baltic Gaz System	2015	2	320,000
Portugal	Sines	REN Atlantico	2004	3	390,000
Puerto Rico	Penuelas	EcoElectrica	2000	1	160,000
Singapore	Singapore	Singapore Energy Authority	2013	3	540,000
Spain	Barcelona	Enagas	1969	8	840,000
	Huelva	Enagas	1988	5	610,000
	Cartagena	Enagas	1989	5	587,000
	Bilbao	Enagas, EVE	2003	3	450,000
	Sagunto	GNF, Osaka Gas, Oman Oil	2006	4	600,000
	Mugardos, El Ferrol	Reganosa, Sonatrach, Sojitz Corp.	2006	2	300,000
	El Musel, Gijón,	Enagas	2013	2	300,000
Sweden	Lysekil	Gasum	2014	1	30,000
	Nynashamn	AGA Gas	2011	1	20,000
Taiwan	Yung-An	CPC	1990	6	690,000
	Tai-Chung	CPC	2009	5	800,000
Thailand	Map Ta Phut	PTT LNG	2011	2	320,000
Turkey	Marmara Ereglisi	Botas	1994	3	255,000
	Izmir	EgeGaz	2006	2	280,000
USA	Everett	Suez LNG NA	1971	2	155,000
	Lake Charles	Shell, ETE	1982	4	425,000
	Freeport	Freeport LNG Development	2008	2	320,000
	Golden Pass, TX	Qatar Petroleum, ExxonMobil	2010	5	775,000
	Pascagoula, MS	Gulf LNG, Kinder	2012	2	320,000
UK	Isle of Grain	National Grid	2005	8	1,000,000
	South Hook	ExxonMobil, Qatar Petroleum,Total	2009	5	775,000
	Dragon LNG, Milford Haven	Shell, Petronas	2009	2	310,000

LNG Import Terminal Projects

Country	Location/Project	Owners/Project Developers	Start up	Storage Tanks	Storage Capacity
China	Shenzhen	CNPC Yudean Power	2021	2	120,000
	Tianjin (Nangang)	Beijing Energy	2022	10	2,000,000
	Yangjiang	CNPC Yudean Power	2023	2	120,000
	Zhangzhou Fujian	CNOOC	2022	2	160,000
India	Dhamra Odisha	Indian Oil, Adani, GAIL	2020	2	320,000
	Jaigarh	Hiranandani Group	2021	2	320,000
	Kodinar	Hindustan Petroleum Corp.	2022	1	160,000
Japan	Himuka	Diagas Group-Osaka Gas	2022	1	65,000

LNG FSRU Import Facilities

Country	Location (Project)	Owners	Start up
Argentina	Escobar GasPort	Excelerate/Enarsa	2011
Bangladesh	Moheshkhali	Excelerate, PetroBangla	2018
	Cox's Bazar	Summit Power International, Excelerate Energy	2019
Brazil	Pecem, FSRU	Petrobras	2009
	Guanabara Bay FSRU	Petrobras	2009
	Salvador, Bahia FSRU	Petrobras	2013
	Porto Sergipe FSRU	Golar LNG/Stonepeak	2020
	Porto do Acu FSRU	GNA	2020
China	Tianjin FSRU	CNOOC, Hoegh, various	2013
Croatia	Hrvatska LNG	MVM	2021
Colombia	Cartagena FSRU	Promigas, Sociedad Portuaria El Cayao	2016
Egypt	Ain Sokhna, Suez	EGAS, BW Gas	2015
Indonesia	Lampung	Hoegh LNG, PGN LNG	2014
	Nusantara (Jakarta Bay)	Golar LNG, Pertimana	2012
	Benoa LNG	PT Pertagas Niaga	2016
	Amurang	Karadeniz	2020
Israel	Hadera Gateway	Israel Electric	2013
Italy	Livorno	OLT Offshore LNG Toscana	2013
Jamaica	Old Harbour	Golar FSRU, New Fortress	2019
Jordan	Aqaba, Jordan	Golar LNG	2015
Kuwait	Mina Al-Ahmadi	KPC	2009
Lithuania	Klaipeda	Klaipedos Nafta Hoegh LNG	2014
Malaysia	Malacca FSRU	Petronas	2012
Malta	FSU Armada Mediterrana	ElectroGas	2016
Myanmar	Thanlyin	CNTIC Vpower	2020
Pakistan	Port Qasim	Excelerate, Engro Corp	2015
	Port Qasim	BW-Mitsui, PGP Consortium	2017
Russia	Kaliningrad FSRU	Gazprom	2020
Turkey	Aliaga FSRU, Turquoise FLNG	Etki LNG	2016
	Dortyol FSRU Challenger	Botas	2018
UAE	Ruwais, Abu Dhabi	Gasco (UAE)	2016
	Jebel Ali Port, Dubai	DSA (UAE)	2010

LNG Export Projects

Country	Location/Project	Project Developers	Planned Start Up	Number of Trains	Capacity In MTPA
AUSTRALIA	Pluto LNG expansion	Woodside	2021+	2	10.0
CANADA	Bear Head LNG, Nova Scotia	LNG Ltd.	2024	4	8.0
	Goldboro LNG, Nova Scotia	Pieridae Energy	2024	2	10.0
	Kitimat LNG, BC	Woodside, Chevron	2024	2	10.0
	LNG Canada, BC	Shell, Mitsubishi, Kogas, PetroChina, Petronas	2024	2	12.0
	Kwispaa FLNG, Vancouver	Steelhead LNG	2024	4	12.0
	Vancouver Tilbury	WesPac Midstream	2021	1	3.25
	Woodfibre LNG, Squamish	Pacific Oil & Gas Co	2020	2	2.1
EQ.GUINEA	Equatorial Guinea Fortuna FLNG	Ophir, Golar LNG, GEPetrol	2020+	1	2.0
INDONESIA	Sengkang LNG	Energy World Corp.	2019	4	2.0
MALAYSIA	Rotan FLNG (Sabah)	Petronas, Murphy Oil	2021	1	1.5
MOZAMBIQUE	Area 1 Onshore	Anadarko Petroleum and partners	2023+	2	10.0
	Area 4 Onshore	Eni and partners	2023+	2	10.0
	Area 4 FLNG	Eni and partners	2022	1	3.4
NIGERIA	NLNG Train 7	NNPC, Shell, Eni, Total	2022+	1	7.0
PAPUA NEW GUINEA	Elk-Antelope LNG	Total, ExxonMobil Oil Search, Petromin	Studies		
RUSSIA	Sakhalin II expansion	Gazprom, Shell, Mitsui, Mitsubishi	2021	studies	
	Vladisvostok LNG	Gazprom, Itochu, various	2023+	2	10.0
	Arctic LNG II Siberia	Novatek, Total	2023	3	19.8
USA	Alaska LNG Nikiski	Alaska Gasline Development Corp.	2023+	3	20.0
	Annova LNG, Brownsville	Exelon Corp.	2023+	6	6.0
	Commonwealth LNG, Louisiana	Commonwealth LNG LLP	2023+	8	9.0
	Delfin LNG, Louisiana	Delfin	2023+	3	9.0
	Driftwood LNG, Louisiana	Tellurian, Total and others	2023	6	27.6
	Galveston Bay LNG	NextDecade	2023+	6	27.0
	Golden Pass, Texas	Qatar Petroleum, ExxonMobil	2024	3	15.6
	Jacksonville, St John's River	Eagle LNG, Ferus Natural Gas Fuels	2021+	small	TBC
	Jordan Cove, Coos Bay	Pembina Corp.	2024	2	7.8
	Lake Charles, Louisiana	Shell, ETE	2024	3	15.0
	Magnolia LNG	Louisiana LNG Ltd.	2023+	4	8.0
	Port Arthur LNG	Sempra	2023+	2	10.0
	Rio Grande LNG	NextDecade	2023+	6	27.0
	Sabine Pass LNG, Louisiana	Cheniere	2016-19	1	4.5
	Texas LNG Brownsville	Chandra, Meyer, Samsung, others	2023+	2	4.0
	VG LNG (Cameron Parish)	Venture Global	2022	5	12.0
	VG LNG (Plaquemines)	Venture Global	2022	10	20.0
	VG LNG (Delta-Plaquemines)	Venture Global	2024	36	22.5

LNG Exporters

Country	Location/Project	Shareholders	Start up	Liquefaction		Storage	
				Trains	capacity (nominal) mtpa	No. of tanks	Total capacity m³
ABU DHABI (UAE)	Das Island (Adgas)	ADNOC, Mitsui, BP, Total	1977	2	3.2	3	240,000
			1994	1	2.5		
ALGERIA	Arzew	Sonatrach GL4Z	1964	3	1.1	3	35,000
	Arzew	Sonatrach GL1Z	1978	6	7.8	3	300,000
	Arzew	Sonatrach GL2Z	1980	6	8.0	3	300,000
	Arzew	Sonatrach	2014	1	4.7		
	Skikda	Sonatrach GL1K II	1980	3	3.0	5	308,000
	Skikda	Sonatrach (rebuild)	2013	1	4.5		
ANGOLA	Soyo	Sonangol, Chevron, BP, ENI, Total	2012	1	5.2	2	370,000
AUSTRALIA	Karratha	NWS Woodside, Shell, BHP	1989	2	5.0	4	260,000
		(BP, Chevron	1992	1	2.5	1	130,000
		(Mistubishi/Mitsui)	2004	1	4.4	1	130,000
		NWS partners	2008	1	4.4	1	130,000
	Darwin	Darwin (Bayu Undan) ConocoPhillips, Santos, Eni, Inpex, TEPCO, Tokyo Gas	2006	1	3.5	1	188,000
	Australia Pacific LNG	ConocoPhillips, Origin Energy, Sinopec	2016	2	7.5	2	320,000
	Gladstone LNG	Santos, Petronas, Total, Kogas	2015	2	7.8	2	280,000
	Gorgon LNG	Chevron, Shell, ExxonMobil	2016	3	15.6	2	360,000
	Pluto LNG	Woodside, Tokyo Gas, Kansei	2012	1	4.8	2	240,000
	QCLNG	Shell, CNOOC	2014	2	8.0	2	280,000
	Wheatstone LNG	Chevron, Woodside, Kuwait (KUFPEC), Jera, Kyushu	2017	2	8.9	2	300,000
	Ichthys LNG	Inpex Corp., Total	2018	2	8.9	2	330,000
	Prelude FLNG	Shell, Inpex, Kogas CPC	2019	1	3.5		
BRUNEI	Lumut	Brunei/Shell/Mitsubishi/Total	1972-74	5	7.2	3	176,000
CAMEROON	Hilli Episeyo FLNG	Kribi Perenco	2018	1	1.2	1	125,000
EGYPT	Damietta	Union Fenosa, EGPC, EGAS	2004	1	5.0	2	300,000
	Idku	EGPC, EGAS, Shell, Total, Petronas	2005	2	7.2	2	280,000
EQ.GUINEA	Bioko Island	Marathon, Sonagas, Mitsui, Marubeni	2007	1	3.4	2	272,000
INDONESIA	Bontang I	Pertamina, VICO, JILCO, Total	1977	2	5.2	5	635,000
	Bontang II		1983	2	5.2		
	Bontang III		1989	1	2.8		
	Bontang IV		1993	1	2.8		
	Bontang V		1997	1	2.8		
	Bontang VI		1999	1	3.0		
	Sulawesi LNG	Medco Energi, Pertamina, Mitsubishi	2015	1	2.0	1	170,000
	Tangguh	BP, MI Berau, CNOOC, Nippon, LNG Japan	2008	2	7.6	2	340,000
MALAYSIA	Bintulu (MLNG Satu)	Petronas, Sarawak, Mitsubishi	1983	3	8.1	4	260,000
	Bintulu (MLNG Dua)	Petronas, Shell, Sarawak, Mitsubishi	1995	3	7.8	1	65,000
	Bintulu (MLNG Tiga)	Petronas, Shell, Sarawak, Mitsubishi, Nippon Oil	2003	2	6.8	1	120,000
	Bintulu Train 9	Petronas	2016	1	3.6		
	Kanowit FLNG	Petronas	2016	1	1.2		
NIGERIA	Bonny Island	NNPC, Shell, Total, Eni	1999	2	6.4	2	168,400
		Nigeria LNG (formed by above)	2002	1	3.2	1	84,200
		Nigeria LNG	2006	2	8.2		
		Nigeria LNG	2008	1	4.1	1	84,200
NORWAY	Snøhvit/Melkoya	Equinor, Total, Petoro	2007	1	4.2	2	280,000
OMAN	Oman LNG	Oman Govt., Shell, Total, Korea LNG Mitsubishi, Mitsui, Partex and Itochu	2000	2	7.1	2	240,000
		Oman Govt.,Oman LNG Union Fenosa, Osaka Gas, & Itochu	2006	1	3.7	2	240,000
PAPUA NEW GUINEA	PNG LNG	ExxonMobil, Oil Search, Santos, JX Nippon Oil	2014	2	6.9	2	320,000
PERU	Peru LNG	Hunt Oil, Shell, Marubeni, SK Group	2010	1	4.4	2	260,000
QATAR	Qatargas 1-T1&2	QP, ExxonMobil, Total, Marubeni, Mitsui	1997	2	6.4	4	340,000
	Qatargas 1-T3	QP, ExxonMobil, Total, Marubeni, Mitsui	1999	1	3.1		
	Qatargas II-T1	QP, ExxonMobil	2009	1	7.8		
	Qatargas II-T2	QP, ExxonMobil, Total	2009	1	7.8	8	1,160,000
	Qatargas III-T1	QP, ConocoPhillips, Mitsui	2010	1	7.8		
	Qatargas IV-TI	QP, Shell	2010	1	7.8		
	RasGas I- T1&2	QP, ExxonMobil, Kogas, Itochu, LNG Japan	1999	2	6.6		
	RasGas II- T3	QP, ExxonMobil	2004	1	4.7		
	RasGas II- T4	QP, ExxonMobil	2005	1	4.7	6	840,000
	RasGas II- T5	QP, ExxonMobil	2007	1	4.7		
	Rasgas III – T6	QP, ExxonMobil	2009	1	7.8		
	Rasgas III – T7	QP, ExxonMobil	2010	1	7.8		
RUSSIA	Sakhalin Island	(Sakhalin Energy) Gazprom, Shell, Mitsui, Mitsubishi	2009	2	9.6	2	200,000
	Yamal LNG Siberia	Novatek, Total, CNPC, Silk Fund	2017	3	16.5	4	640,000
TRINIDAD & TOBAGO	Point Fortin Train 1	BP, Shell, CIC, NGC	1999	1	3.0	2	204,000
	Train 2	BP, Shell	2002	1	3.3	1	160,000
	Train 3	BP, Shell	2003	1	3.3	1	160,000
	Train 4	BP, Shell, NGC	2005	1	5.2	1	160,000
USA	Cheniere Sabine Pass	Cheniere Energy	2016	5	22.5	5	800,000
	Cove Point LNG	Dominion Energy	2017	1	5.3	7	695,000
	Cheniere Corpus Christi	Texas Cheniere	2018	2	9.0	3	480,000
	Cameron Hackberry	Sempra, Total, Mitsui, Mitsubishi	2019	2	9.8	3	480,000
	Elba Island Georgia	Kinder Morgan, EIG Energy	2019	10	2.5	5	535,000
	Freeport LNG,Texas	Freeport LNG	2019	2	10.2	3	483,000
YEMEN	Bal-Haf	Yemen LNG, Total, Yemen Gas, Hunt Oil, SK Group, Hyundai	2009	2	6.7	2	320,000

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